CONTENTS

TRADE NAME	MODEL	SET AND FOLDER No.
Bell Sound	2256	277-2
David Bogen	R750	277-3
Firestone	13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210) Tel. Rec.	277-4
Fisher	FM-80	277-5
Grommes	LJ-3	277-6
Hoffman	21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M728N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U (Ch. 408-21, B, L, N, 410-24, B) Tel. Rec.	277-7
Motorola	54HF1, B (Ch. HS-443)	277-8
Motorola	64X1, 64X2 (Ch. HS-440)	277-9
Oldsmobile	983204, 983205 Prod. Chg. Bul. 123	277-1
RCA Victor	17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X) Tel. Rec.	277-10
Stewart-Warner	21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D Tel. Rec.	277-11
Westinghouse	H-443T5, H-444T5, A, H-445T5, A, H-446T5, A (Ch. V-2189-4)	277-12
Zenith	R512F, R, V, W (Ch. 5R10)	277-13

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 7 IN SET 267

OLDSMOBILE MODEL 983204

Oldsmobile auto radio model 983090 was covered in Photofact Folder 7 — Set 267.

Oldsmobile model 983204 (For All 1955 Cars) is identical to model 983090, except for the following:

ELECTRICAL CHANGES

Vibrator hash choke (L10) changed to part #1220683.

C10 changed to a .005MFD, 600V tubular, part #6531.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MECHANICAL CHANGES

Description	New Part Number
Pointer Mechanism Pkg.	1220704
Trim Plate	564389
Knob, volume	566635
Knob, tone and dummy	7266016

PRODUCTION CHANGES
BULLETIN 123

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 10 IN SET 261

OLDSMOBILE MODEL 983205

Oldsmobile auto radio model 983091 was covered in Photofact Folder 10 — Set 261.

Oldsmobile model 983205 (For All 1955 Cars) is identical to model 983091, except for the following:

ELECTRICAL CHANGES

Vibrator hash choke (L9) changed to part #1220683.

C7 and C8 changed to 100MMF molded mica ± 5% (part #1219498).

C20 is increased from .007MFD to .008MFD, 1600V tubular (part #H-802).

R10 changed to a 12KΩ, 2 watt, part #1276.

R17 changed to a 47KΩ, 1 watt, part #1259.

R24 changed to a 1000Ω, ½ watt, part #1220176.

R25 changed to a 220Ω, ½ watt, part #1117.

MECHANICAL CHANGES

Description	New Part Number
Motor Gear Train	7265765
Worm Gear Pkg.	1220673
Knob, volume	566635
Knob, tone	7266015
Knob, sensitivity	7266019

PRODUCTION CHANGES
BULLETIN 123

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

BELL SOUND
MODEL 2256

BELL SOUND
MODEL 2256

TRADE NAME	Bell Sound Model 2256
MANUFACTURER	Bell Sound Systems, Inc., 555 Marion Rd., Columbus, Ohio
TYPE SET	AC Operated 6 Channel 12 Watt Audio Amplifier
TUBES (Six)	Types 12AX7 Preamp., 12AX7 AF Amp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC - 50/60 Cycles RATING .67 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

BELL SOUND MODEL 2256

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Bell Sound PART No.	STANDARD REPLACEMENT		
V1	Preamplifier	12AX7	12AX7	9A	
V2	AF Amplifier	12AX7	12AX7	9A	
V3	AF Amplifier-Phase Inv.	12AX7	12AX7	9A	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Audio Output	6V6GT	6V6GT	7S	
V6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

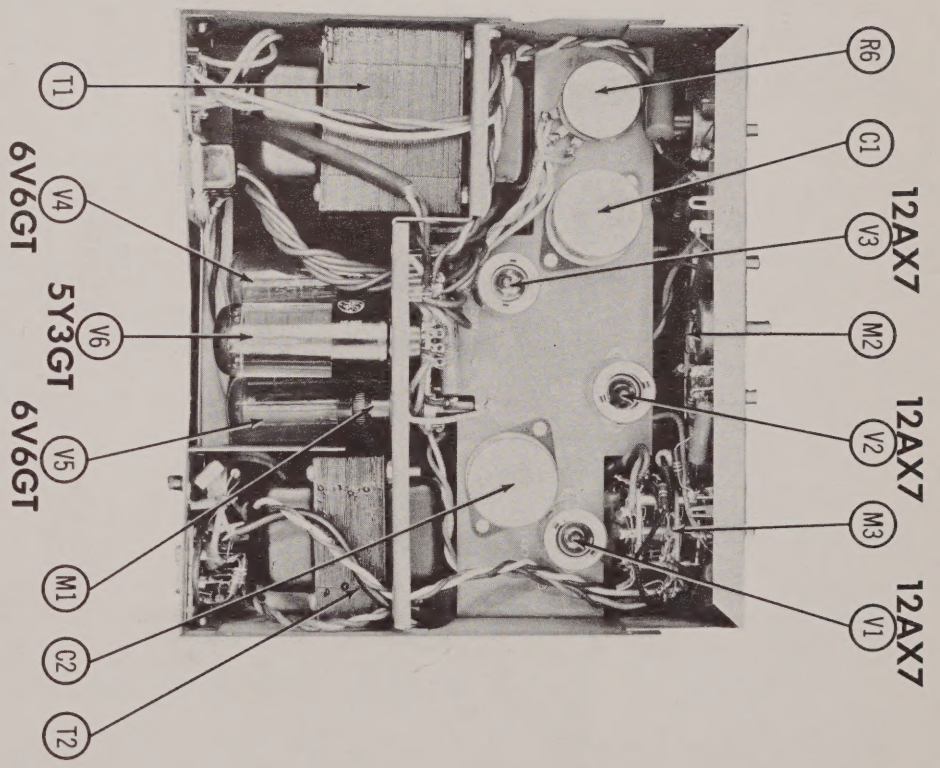
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Bell Sound PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450						D-225	
B	■40	450						FM-0505	
C	▲40	50							
C2A	▲40	450						D-230	
B	▲40	450						FM-4520	
C3	150	15				TC495	TD-150-50	MTH-1510	
								MT-0250	
C4	470	500		D6-471				K-1347	
C5	27	500		D6-270				K-1427	
C6	100	500		D6-101		MC235		K-1310	
C7	.004	400							
C8	.006	400							
C9	.01	400							
C10	.1	400				PT401	IMP4-P1	330401	
C11	.00068	400		D6-680				K-1368	
C12	.0013	400							
C13	.003	400		D6-302	811-003	PT623	IMP6-D3	330623	
C14	470	500		D6-471				K-1347	
C15	270	500		D6-271				K-1327	
C16	.01	400							
C17	.01	400							
C18	.02	400		DF-203	817-02	PT412	IMP4-S2	330412	
C19	.05	400		DF-503		PT415	IMP4-S5	330415	
C20	15	500		D6-150				K-1415	
C21	.05	400		DF-503		PT415	IMP4-S5	330415	
C22	.05	400		DF-503		PT415	IMP4-S5	330415	
C23	200	500		TCZ-200		MCB237		KR-1320	
C24	.002	400							
C25	10	500		TCZ-10				KR-1410	
C26	.001	400							
C27	.01	400							
C28	100	500		TCZ-100				KR-1310	
C29	.05	400		DF-503		PT415	IMP4-S5	330415	
C30	.05	400		DF-503		PT415	IMP4-S5	330415	
C31	100	500		TCZ-100		MCB235		KR-1310	
C32	.05	400		DF-503		PT415	IMP4-S5	330415	
C33	.047	400		DF-503		PT4147	IMP4-S47	3304147	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	Bell Sound PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	B20066P103	Q13-139	A47-2Meg-Z	B-76-S	U-55	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A
R2A	2Meg	½	B20066P102	Q13-139	A47-2Meg-Z	B-76	U-55	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	B20066P97	Q13-133	A47-500K-Z	B-60	U-48	Gain
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4	250KΩ	½	B20066P125					Loudness -tapped @ 100KΩ and 150KΩ
R5A	300KΩ	½	B20066P128			AB-51		Radio Set Level
B	Shaft		Not Req.			AK-1		Attach to R5A
R6A	100Ω	2	B20066P115	WK-100	A43-100		R100L	Hum Balance -wire-wound
B	Shaft		Not Req.	Not Req.	FKS-1/4		Not Req.	Attach to R6A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Bell Sound PART No.	IRC PART No.	
R7	1.2Meg	½		BTS-1.2Meg	
R8	150KΩ	½		BTS-150K	
R9	27KΩ	½		BTS-27K	
R10	47KΩ	½		BTS-47K	
R11	10KΩ	½		BTS-10K	
R12	3900Ω	½		BTS-3900	
R13	30KΩ 5%	½		BTS-30K 5%	
R14	470KΩ	½		BTS-470K	
R15	2.2Meg	½		BTS-2.2Meg	
R16	620Ω 5%	½		BTS-620 5%	
R17	36KΩ 5%	½		BTS-36K 5%	
R18	75KΩ 5%	½		BTS-75K 5%	
R19	150KΩ	½		BTS-150K	
R20	27KΩ	½		BTS-27K	
R21	27KΩ	½		BTS-27K	
R22	27KΩ	½		BTS-27K	
R23	100KΩ	½		BTS-100K	
R24	470KΩ	½		BTS-470K	
R25	2700Ω 5%	½		BTS-27K 5%	
R26	430KΩ 5%	½		BTS-430K 5%	
R27	100KΩ	½		BTS-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Bell Sound PART No.	IRC PART No.	
R28	470KΩ	½		BTS-470K	
R29	1300Ω 5%	½		BTS-1300 5%	
R30	100KΩ	½		BTS-100K	
R31	200KΩ 5%	½		BTS-200K 5%	
R32	20KΩ 5%	½		BTS-20K 5%	
R33	27KΩ	½		BTS-27K	
R34	18KΩ 5%	½		BTS-18K 5%	
R35	2000Ω 5%	½		BTS-2000 5%	
R36	100KΩ	½		BTS-100K	
R37	1.2Meg	½		BTS-1.2Meg	
R38	3300Ω	½		BTS-3300	
R39	100KΩ 5%	½		BTS-100K 5%	
R40	100KΩ 5%	½		BTS-100K 5%	
R41	270KΩ	½		BTS-270K	
R42	250Ω	4		PW4-250	
R43	270KΩ	½		BTS-270K	
R44	47KΩ	½		BTS-47K	
R45	1500Ω	1		BTA-1500	
R46	100KΩ	2		BTB-100K	
R47	2700Ω	½		BTS-2700	
R48	220KΩ	½		BTS-220K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .67A	676VCT .093ADC	5VAC @2A	6.3VAC @2A	B-20274					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Bell Sound PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	7.66KΩ CT	16Ω tap @ 8Ω, 4Ω	B-20273						

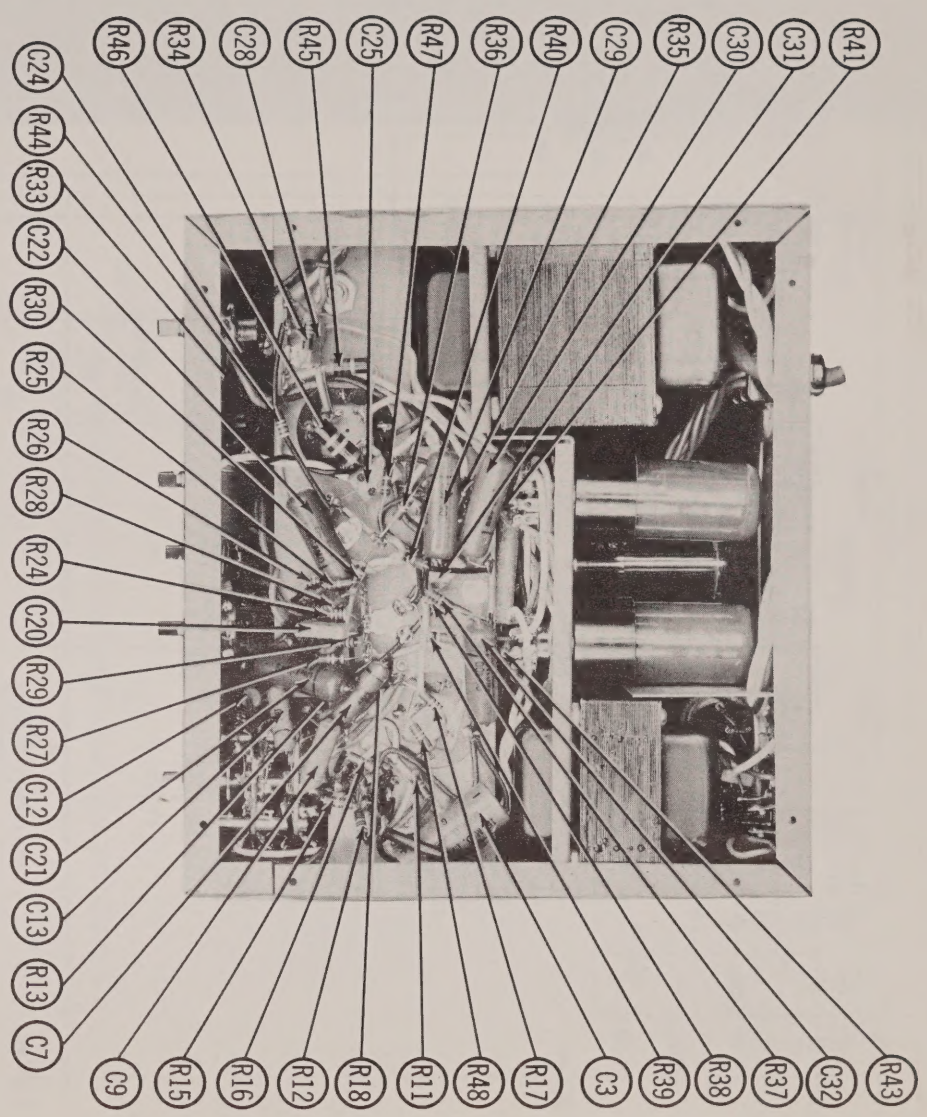
FUSES

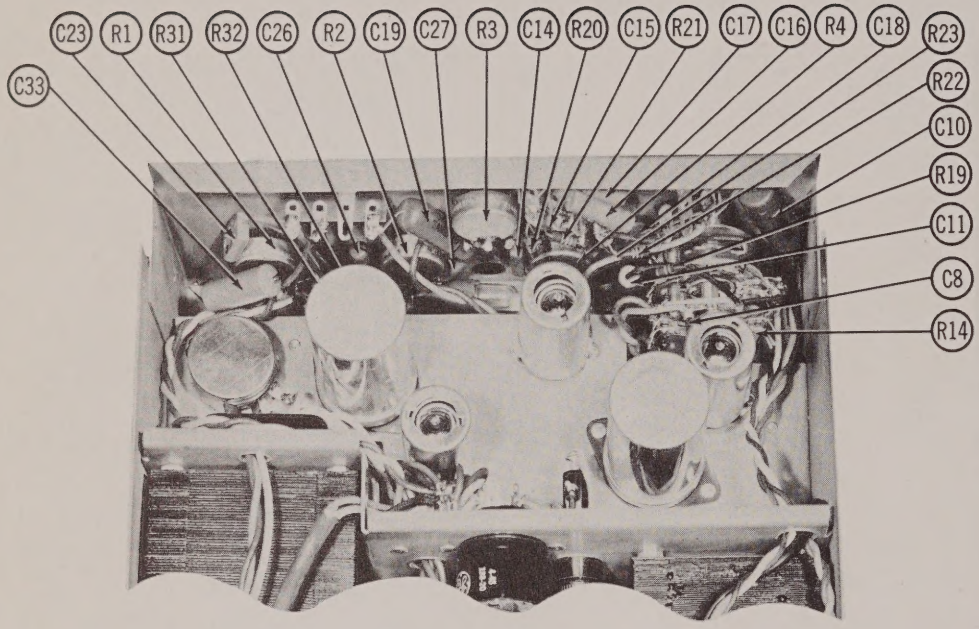
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Bell Sound PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1½A 250V			31201.5 (3AG-1½A)	342001	AGC 1½	HKP

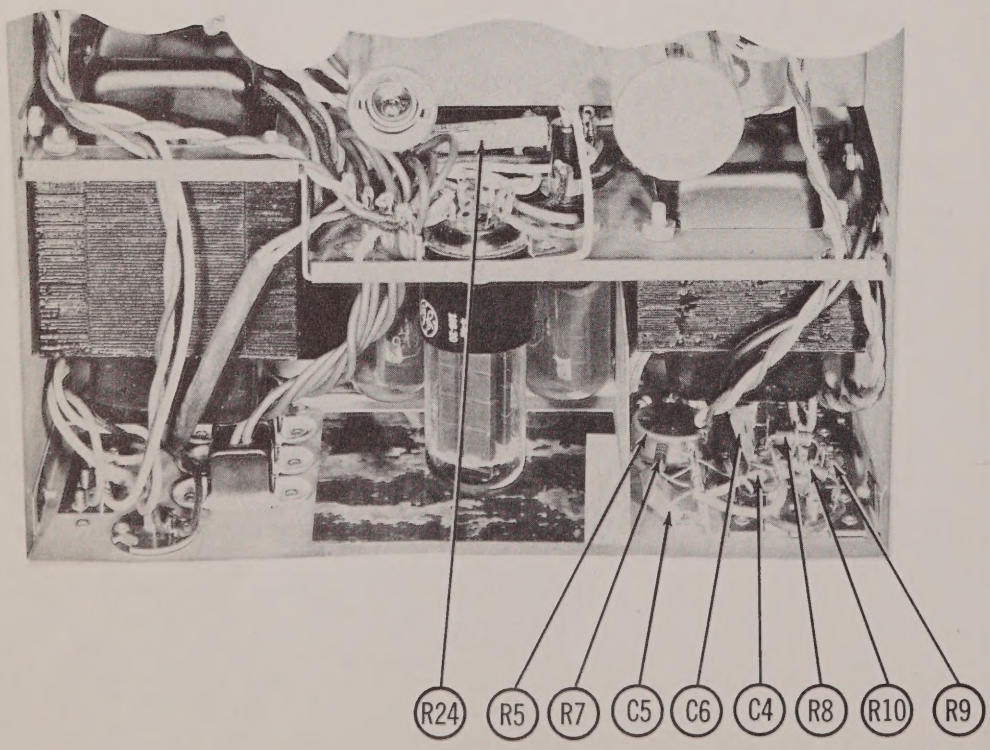
MISCELLANEOUS

ITEM No.	PART NAME	Bell Sound PART No.	NOTES
M2	Pilot Light		#47 Bayonet
M3	Switch		Equalizer and selector

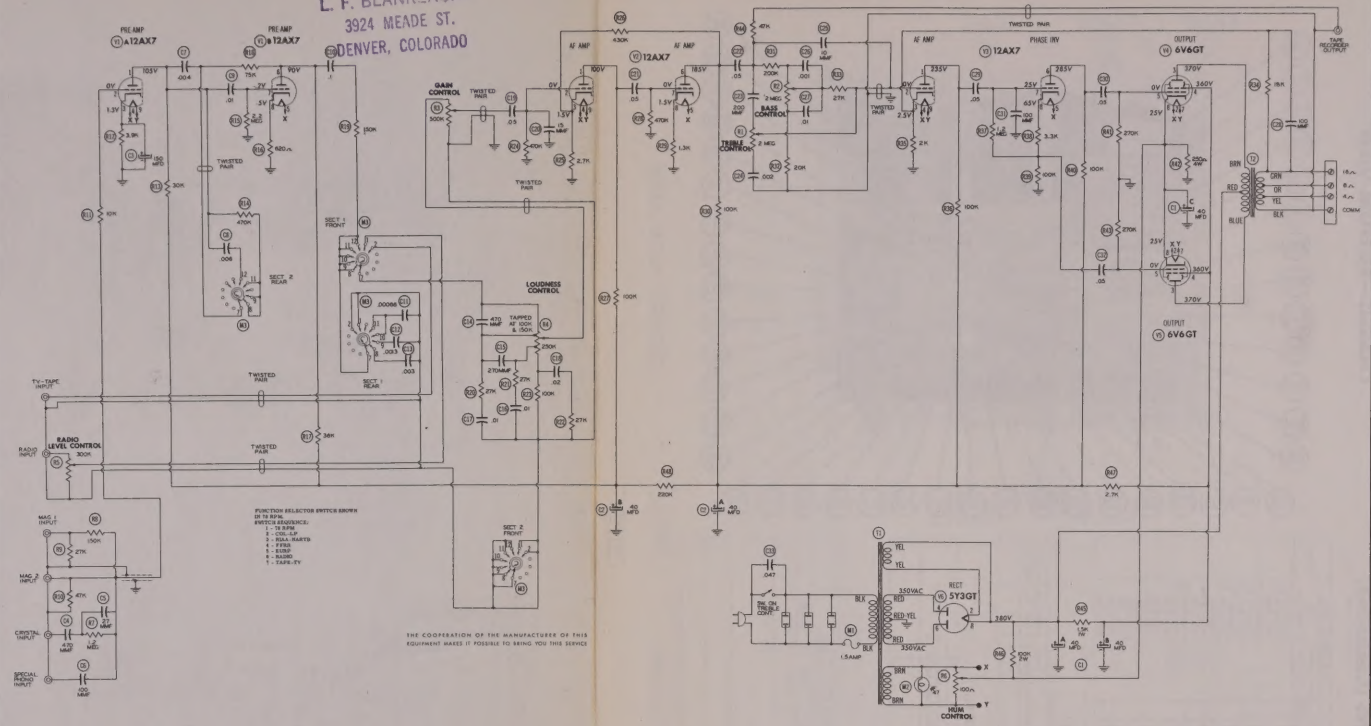
CHASSIS—BOTTOM VIEW




C23
R1
R31
R32
C26
R2
C19
C27
R3
C14
R20
C15
R21
C17
C16
R4
C18
R23
C33
R22
C10
R19
C11
C8
R14


R24
R5
R7
C5
C6
C4
R8
R10
R9

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†254KΩ	57KΩ	3.9KΩ	275Ω	275Ω	†280KΩ	2.2Meg	620Ω	275Ω
V 2	12AX7	†324KΩ	470KΩ	2.7KΩ	275Ω	275Ω	†104KΩ	470KΩ	1.3KΩ	275Ω
V 3	12AX7	†104KΩ	50KΩ	2KΩ	275Ω	275Ω	†104KΩ	1.3Meg	103KΩ	275Ω
V 4	6V6GT	0Ω	275Ω	275Ω	1.5KΩ	270KΩ	NC	275Ω	250Ω	
V 5	6V6GT	0Ω	275Ω	275Ω	1.5KΩ	270KΩ	NC	275Ω	250Ω	
V 6	5Y3GT	NC	70KΩ	NC	130Ω	NC	130Ω	NC	70KΩ	

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Normal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

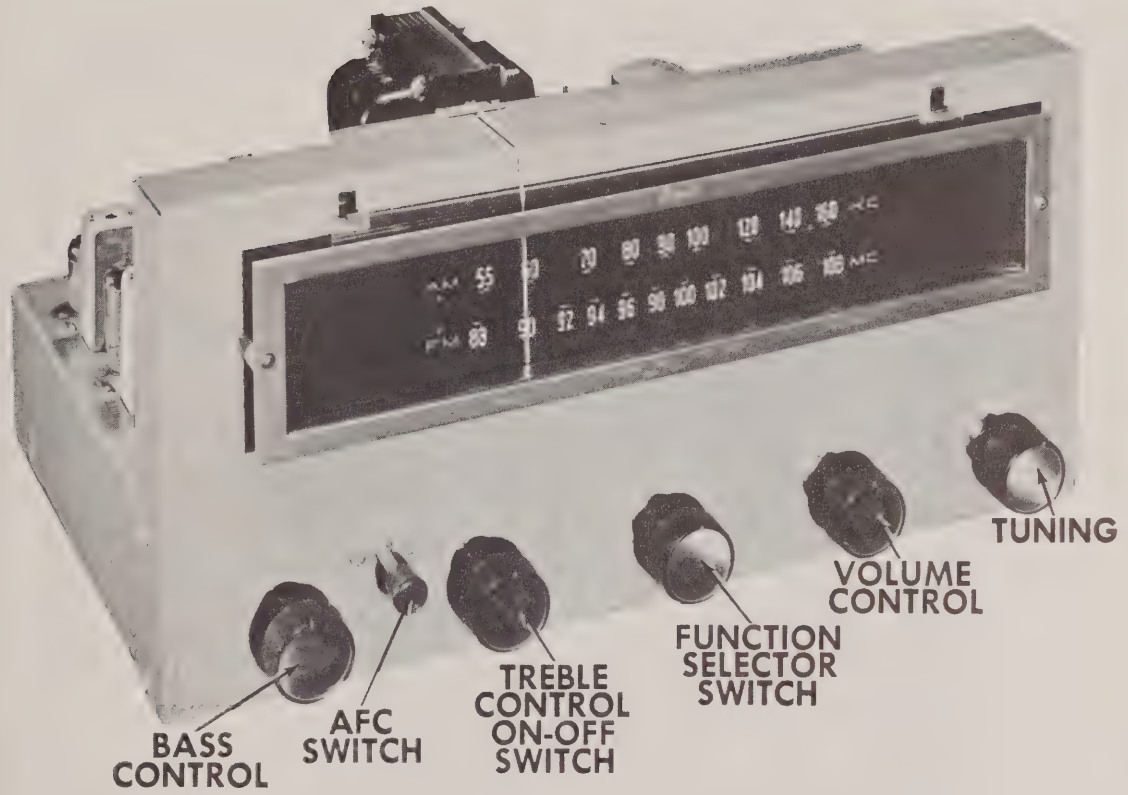
ALL MEASUREMENTS TAKEN WITH SELECTOR SWITCH IN MAXIMUM COUNTER CLOCKWISE POSITION
† MEASURED FROM PIN 8 OF V6
NC - NO CONNECTION
TP - TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

DAVID BOGEN MODEL R750

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DAVID BOGEN
MODEL R750

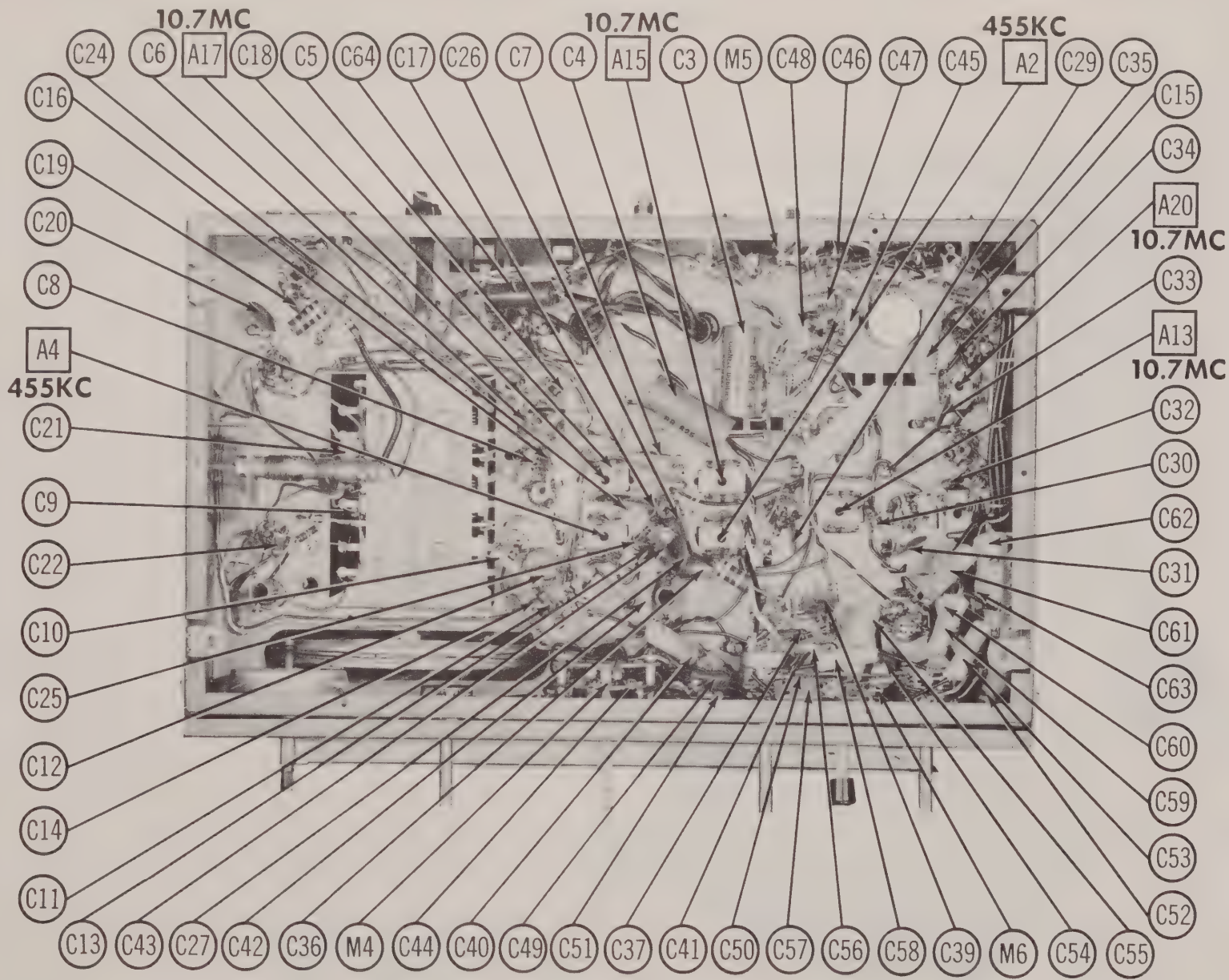


DAVID BOGEN
MODEL R750

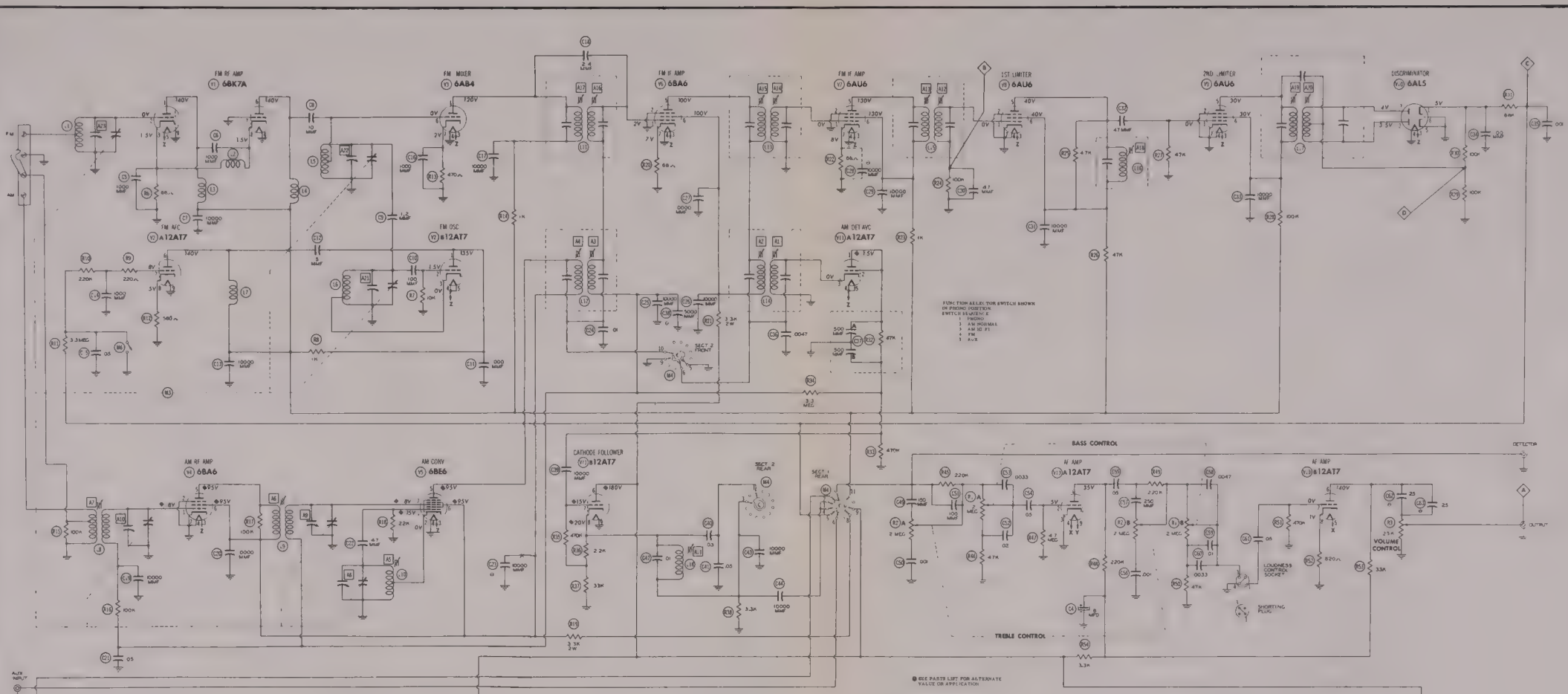
TRADE NAME	David Bogen Model R750	
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York 14, N.Y.	
TYPE SET	AC Operated AM-FM Superheterodyne Tuner For Custom Installation	
TUBES	Fourteen	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING .44 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	535KC-1650KC	FREQ. MOD. 88MC-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



AM IF = 455KC
FM IF = 10.7MC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	†1.5KΩ	0Ω	68Ω	25Ω	25Ω	†1.5KΩ	0Ω	68Ω	25Ω
V 2	12AT7	†2.5KΩ	10KΩ	0Ω	25Ω	25Ω	†1.5KΩ	▲3.5Meg	560Ω	25Ω
V 3	6AB4	†2.5KΩ	TP	25Ω	25Ω	TP	0Ω	470Ω		
V 4	6BA6	.1Ω	0Ω	25Ω	25Ω	*14.8KΩ	*14.8KΩ	0Ω		
V 5	6BE6	22KΩ	0Ω	25Ω	25Ω	*14.8KΩ	*14.8KΩ	.1Ω		
V 6	6BA6	3.7Meg	0Ω	25Ω	25Ω	†4.8KΩ	†4.8KΩ	68Ω		
V 7	6AU6	100	68Ω	25Ω	25Ω	†2.5KΩ	†2.5KΩ	68Ω		
V 8	6AU6	100KΩ	0Ω	25Ω	25Ω	†48.5KΩ	†48.5KΩ	0Ω		
V 9	6AU6	47KΩ	0Ω	25Ω	25Ω	†100KΩ	†100KΩ	0Ω		
V 10	6AL5	200KΩ	100KΩ	25Ω	25Ω	0Ω	TP	100KΩ		
V 11	12AT7	500KΩ	500KΩ	0Ω	25Ω	25Ω	*11.5KΩ	500KΩ	33.2KΩ	25Ω
V 12	12AT7	1188KΩ	100KΩ	1.5KΩ	25Ω	25Ω	1166KΩ	3.3Meg	0Ω	25Ω
V 13	12AT7	1250KΩ	4.7Meg	0Ω	25Ω	25Ω	†37.5KΩ	470KΩ	820Ω	25Ω
V 14	6X4	170Ω	NC	25Ω	25Ω	TP	170Ω	200KΩ		

ALL MEASUREMENTS TAKEN IN FM POSITION UNLESS OTHERWISE NOTED
TP - TIE POINT
NC - NO CONNECTION
† MEASURED FROM PIN 7 OF V14.
* MEASURED IN AM POSITION.
▲ AFC DEFEAT SWITCH OPEN

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

277-3

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	455KC (400∿Mod)	AM (Normal)	Tuning gang fully open	DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4	Adjust for maximum output.
2.	200MMF	High side to AM Antenna terminal lug. Low side to chassis.	600KC	"	600KC	"	A5, A6, A7	"
3.	"	"	1500KC	"	1500KC	"	A8, A9, A10	Adjust for maximum output. Repeat steps 2 and 3.
4.	.01MFD	High side to pin 7 (grid) of 12AT7 (V10). Low side to chassis.	10KC (Unmod)	"		"	A11	Adjust for MINIMUM output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe thru 100KΩ to point Ⓑ Common to chassis.	A12, A13, A14, A15, A16, A17	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe thru 100KΩ to point Ⓓ Common to chassis.	A18, A19	"
7.	"	"	"	"	"	DC probe thru 100KΩ to point Ⓒ Common to chassis.	A20	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. thru 100KΩ to point Ⓑ. Low side to chassis.	A12, A13, A14, A15, A16, A17	Adjust for maximum amplitude and symmetry similar to Fig. 1.
6.	"	"	"	"	"	Vert. Amp. thru 100KΩ to point Ⓓ. Low side to chassis.	A18, A19	"
7.	"	"	"	"	"	Vert. Amp. thru 100KΩ to point Ⓒ. Low side to chassis.	A20	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A18 and A19 for maximum and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω Carbon Resistor	High side to FM antenna terminal lug. Low side to chassis.	106MC	FM	106MC	DC probe thru 100KΩ to point Ⓑ. Common to chassis.	A21, A22, A23	Adjust for maximum deflection.

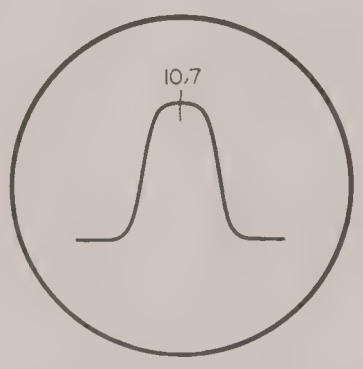


FIG. 1

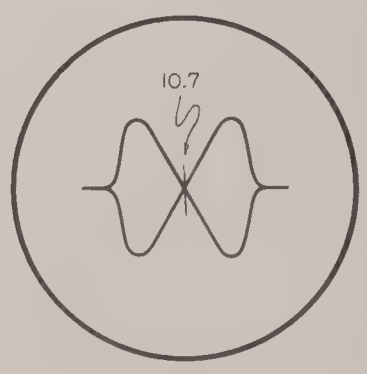
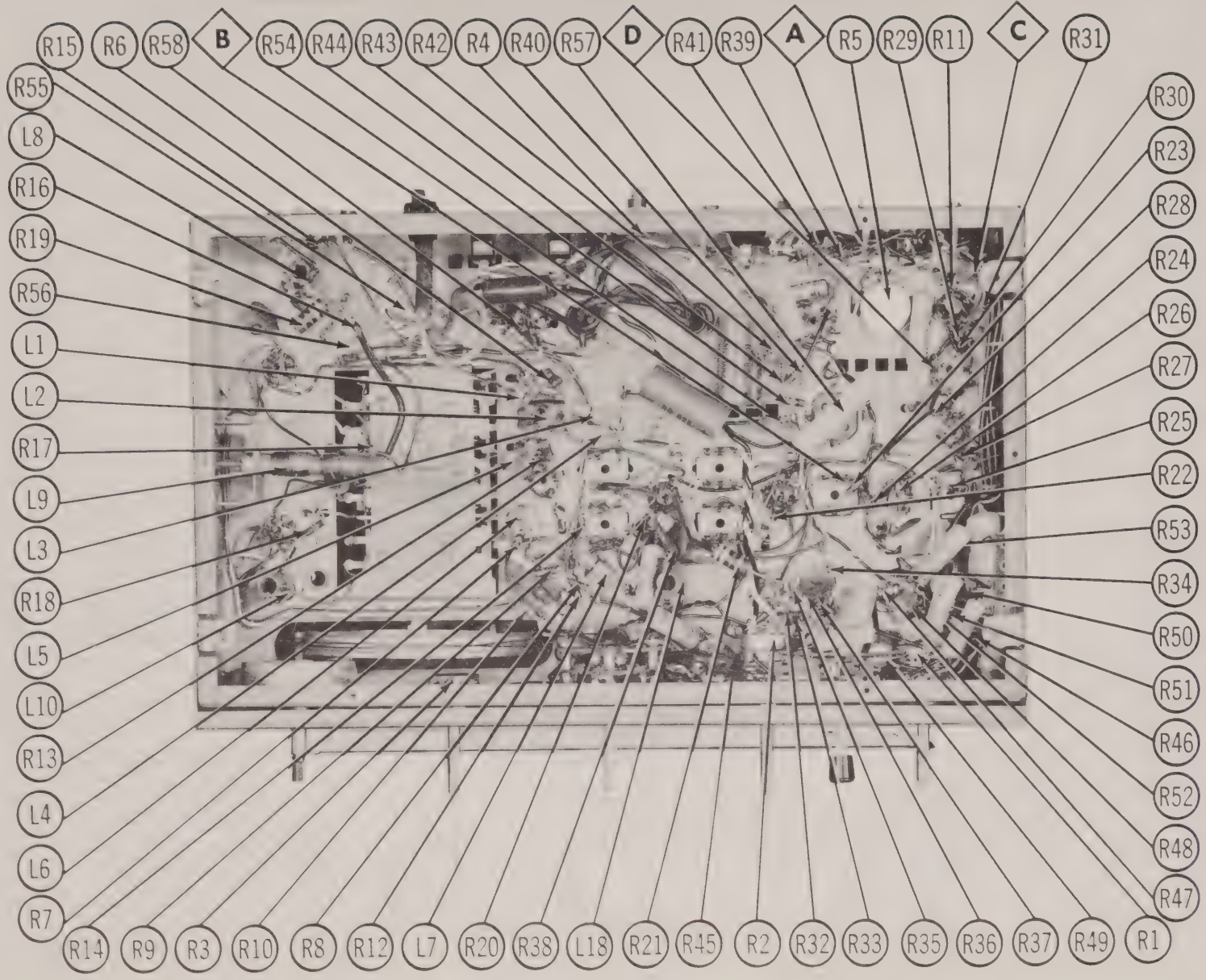


FIG. 2



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DAVID BOGEN
MODEL R750

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	455KC (400% Mod)	AM (Normal)	Tuning gang fully open	DC probe to point (A). Common to chassis.	A1, A2, A3, A4	Adjust for maximum output.
2.	200MMF	High side to AM Antenna terminal lug. Low side to chassis.	600KC	"	600KC	"	A5, A6, A7	"
3.	"	"	1500KC	"	1500KC	"	A8, A9, A10	Adjust for maximum output. Repeat steps 2 and 3.
4.	.01MFD	High side to pin 7 (grid) of 12AT7 (V10). Low side to chassis.	10KC (Unmod)	"		"	All	Adjust for MINIMUM output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe thru 100KΩ to point (B) Common to chassis.	A12, A13, A14, A15, A16, A17	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe thru 100KΩ to point (D) Common to chassis.	A18, A19	"
7.	"	"	"	"	"	DC probe thru 100KΩ to point (C) Common to chassis.	A20	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. thru 100KΩ to point (B). Low side to chassis.	A12, A13, A14, A15, A16, A17	Adjust for maximum amplitude and symmetry similar to Fig. 1.
6.	"	"	"	"	"	Vert. Amp. thru 100KΩ to point (D). Low side to chassis.	A18, A19	"
7.	"	"	"	"	"	Vert. Amp. thru 100KΩ to point (C). Low side to chassis.	A20	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A18 and A19 for maximum and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω Carbon Resistor	High side to FM antenna terminal lug. Low side to chassis.	106MC	FM	106MC	DC probe thru 100KΩ to point (B). Common to chassis.	A21, A22, A23	Adjust for maximum deflection.

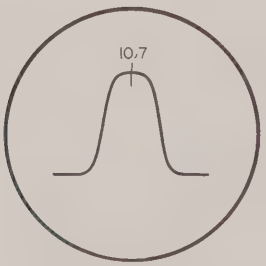


FIG. 1

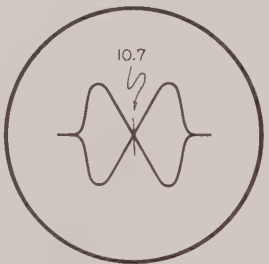


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

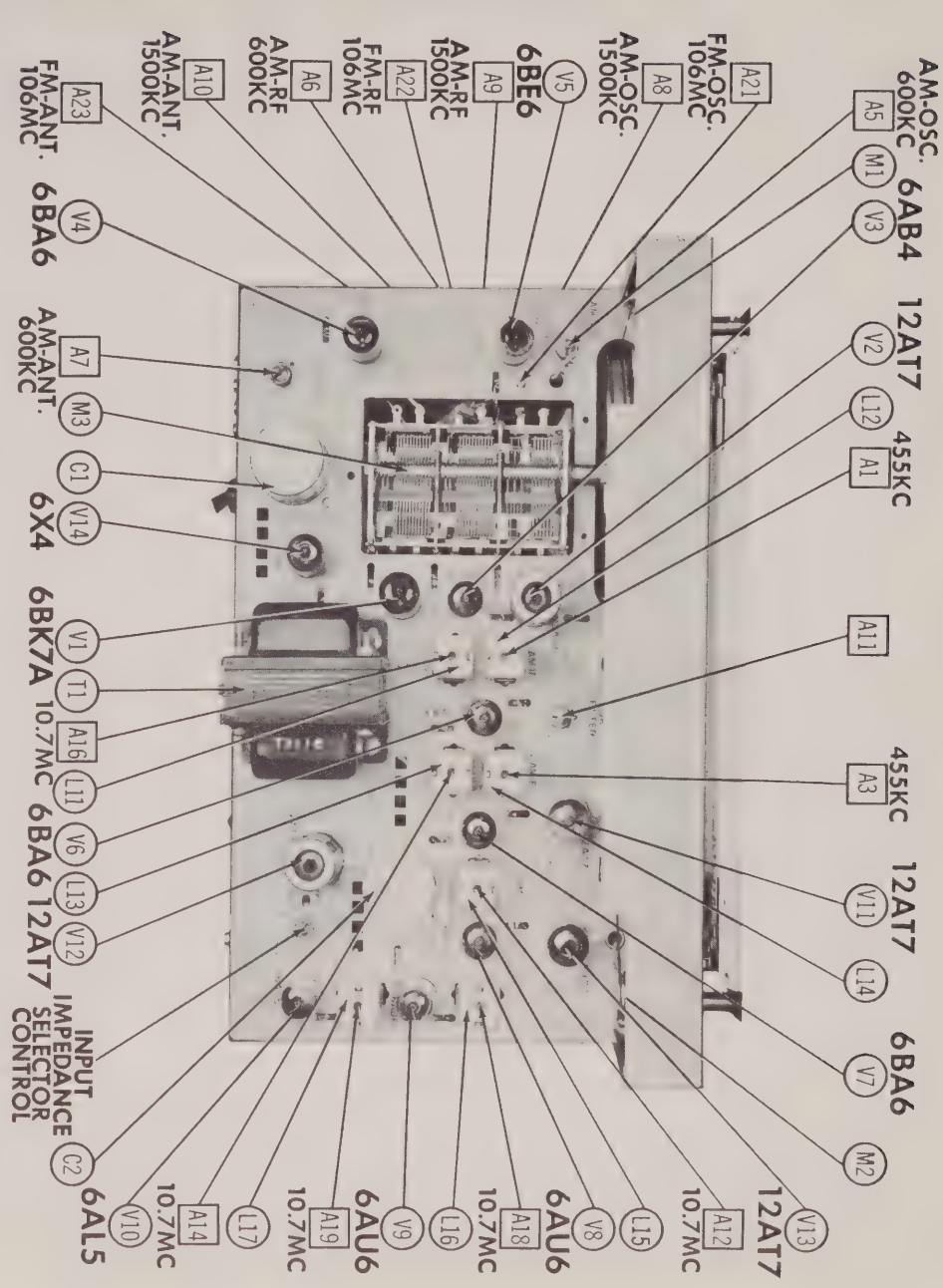
ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		David Bogen PART No.	STANDARD REPLACEMENT		
V1	FM RF Amp.	6BK7A	6BK7A	9AJ	
V2	FM AFC-FM Osc.	12AT7	12AT7	9A	
V3	FM Mixer	6AB4	6AB4	5CE	
V4	AM RF Amp.	6BA6	6BA6	7BK	
V5	AM Converter	6BE6	6BE6	7CH	
V6	FM IF Amp.	6BA6	6BA6	7BK	
V7	FM IF Amp.	6AU6	6AU6	7BK	
V8	First Limiter	6AU6	6AU6	7BK	
V9	Second Limiter	6AU6	6AU6	7BK	
V10	Discriminator	6AL5	6AL5	6BT	
V11	AM Det-AVC-Cathode Follower	12AT7	12AT7	9A	
V12	Phono Pre-Amp.	12AT7	12AT7	9A	
V13	AF Amp.	12AT7	12AT7	9A	
V14	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	David Bogen PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	20	450				FP238	TM-D40-450	D-235	
B	20	450							
C2A	20	450				FP238	TM-D40-450	D-235	
B	20	450							
C3	8	250				TC71	TD-8-450	MT-4508	
C4	8	250				TC71	TD-8-450	MT-4508	
C5	1000			D6-102	GP2L-102	UC-521		K-1210	
C6	1000			D6-102	GP2L-102	UC-521		K-1210	
C7	10000			DD-103	811-01	DC-511			
C8	10			D6-100	GP1K-100	UC-541		K-1410	
C9	1.2								
C10	100								
C11	1000			D6-102	GP2L-102	UC-521		K-1210	
C12	5				GP1K-050	ZT-555			
C13	10000			DD-103	811-01	DC-511			
C14	1000			D6-102	GP2L-102	UC-521		K-1210	
C15	.05	200		DF-503		PT415	IMP2-S5		
C16	1000			D6-102	GP2L-102	UC-521		K-1210	
C17	10000			DD-103	811-01	DC-511			
C18	2.4								
C19	10000			DD-103	811-01	DC-511			
C20	10000			DD-103	811-01	DC-511			
C21	.05	400		DF-503		PT415	IMP2-S5	330215	
C22	47			D6-470	GP1K-470	UC-5447		K-1447	
C23	10000			DD-103	811-01	DC-511			Note 1
C24	.01	200		D6-103	811-01	PT411	IMP4-S1	330211	
C25	10000			DD-103	811-01	DC-511			
C26	10000			DD-103	811-01	DC-511			
C27	10000			DD-103	811-01	DC-511			
C27	10000			DD-103	811-01	DC-511			
C28	10000			DD-103	811-01	DC-511			Note 1
C29	10000			DD-103	811-01	DC-511			
C30	47				GP1K-470	UC-5447		K-1447	
C31	10000			DD-103	811-01	DC-511			
C32	47			DD-103	GP1K-470	UC-5447		K-1447	
C33	10000			DD-103	811-01	DC-511			
C34	100			D6-101	GP1K-101	UC-531		K-1310	
C35	.001	200		D6-102	801-001	PT621	IMP6-D2	330221	
C36	.0047	200		D6-472	811-0047	PT6247	IMP6-D47	3306247	
C37A	500			♦PC-50	♦1403-01				
B	500								
C38	5000			D6-502	811-005	DC-525			Note 1
C39	10000			DD-103	811-01	DC-511			
C40	.03	200				PT413	IMP6-S3		
C41	.05	200		DF-503		PT415	IMP2-S5	330215	
C42	.01	200		D6-103	811-01	PT411	IMP4-S2	330211	
C43	10000			DD-103	811-01	DC-511			
C44	10000			DD-103	811-01	DC-511			
C45	3300	500		MD-332					

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA David Bogen PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C46	22			D6-220	GP1K-220	UC-5422		K-1422	
C47	.01	200		D6-103	811-01	PT411	IMP4-S1	330211	
C48	.05	200		DF-503		PT415	IMP2-S5	330215	
C49	150	500			811-151	MC238		K-1315	
C50	.001	200		D6-102	811-102	PT621	IMP6-D1	330221	
C51	100			D6-101	GP1K-101	UC-531		K-1310	
C52	.02	200		DF-203	817-02	PT412	IMP2-S2	330212	
C53	.0033	200		D6-332	811-0033	PT6233	IMP6-D33	3306233	
C54	.05	400		DF-503		PT415	IMP4-S5	330415	
C55	.05	400		DF-503		PT415	IMP4-S5	330415	
C56	.001	200		D6-102	801-001	PT621	IMP6-D1	330221	
C57	250	500		MD-251		MCB240		K-1325	
C58	.0047	200		D6-472		PT6247	IMP6-D47	3306247	
C59	.01	200		D6-103	811-01	PT411	IMP4-S1	330211	
C60	.0033	200		D6-332	811-0033	PT6233	IMP6-D33	3306233	
C61	.05	200		DF-503		PT415	IMP2-S5	330215	
C62	.25	200				PT4025	IMP2-P25	3302025	Note 2
C63	.25	200				PT4025	IMP2-P25	3302025	Note 2
C64	.047	400		DF-503		PT4147	IMP2-S47	3304147	

♦ Items C37A, C37B and R32 are combined in one unit.
Note 1. Not used in some versions.
Note 2. C63 is not used when C62 is a .5MFD capacitor.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA David Bogen PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	V331A	Q11-139	DS-36-S	BB-110	UF26L	Bass
B	2Meg	½		M11-139			UR26L	
C	Shaft		Not Req.	Not Req.	Not Req.	Not Req.	DS-36	Attach to R1A
R2A	2Meg	½	V330A	Q11-139		DC-36-S	UF26L	Treble
B	2Meg	½		M11-139			UR26L	
C	Shaft		Not Req.	Not Req.			DS-36	Attach to R2A
D	Switch		Not Req.	76-1		SWA	US-36	Attach to R2B
R3A	25KΩ	½	V329B	Q13-120	A47-25K-W	AB-29		Volume
B	Shaft		Not Req.	Not Req.	FS-3	AK-3		Attach to R3A
R4A	50Ω	1	V113	W-50	A43-50	VK-116	C50P	Hum Balance (Wire wound)
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R4A
R5A	100KΩ	½	V332	Q13-128	A47-100K-Z	AB-31	U-39	Input Impedance Selector
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	IRC PART No.	NOTES
R6	68Ω	½		BTS-68	
R7	10KΩ	½		BTS-10K	
R8	1000Ω	½		BTS-1000	
R9	220Ω	½		BTS-220	
R10	220KΩ	½		BTS-220K	
R11	3.3Meg	½		BTS-3.3Meg	
R12	560Ω	½		BTS-560	
R13	470Ω	½		BTS-470	
R14	1000Ω	½		BTS-1000	
R15	100KΩ	½		BTS-100K	
R16	100KΩ	½		BTS-100K	
R17	100KΩ	½		BTS-100K	
R18	22KΩ	½		BTS-22K	
R19	3300Ω	2		BTB-3300	
R20	68Ω	½		BTS-68	
R21	3300Ω	2		BTB-3300	
R22	68Ω	½		BTS-68	
R23	1000Ω	½		BTS-1000	
R24	100KΩ	½		BTS-100K	
R25	4700Ω	½		BTS-4700	
R26	47KΩ	½		BTS-47K	
R27	47KΩ	½		BTS-47K	
R28	100KΩ	½		BTS-100K	
R29	100KΩ	½		BTS-100K	
R30	100KΩ	½		BTS-100K	
R31	68KΩ	½		BTS-68K	
R32	47KΩ	½		BTS-47K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	IRC PART No.	NOTES
R33	470KΩ	½		BTS-470K	
R34	3.3Meg	½		BTS-3.3Meg	
R35	470KΩ	½		BTS-470K	
R36	2200Ω	½		BTS-2200	
R37	33KΩ	½		BTS-33K	
R38	3300Ω	½		BTS-3300	
R39	1500Ω	½		BTS-1500	
R40	68KΩ	½		BTS-68K	
R41	56KΩ	½		BTS-56K	
R42	3.3Meg	½		BTS-3.3Meg	
R43	68KΩ	½		BTS-68K	
R44	100KΩ	½		BTS-100K	
R45	220KΩ	½		BTS-220K	
R46	47KΩ	½		BTS-47K	
R47	4.7Meg	½		BTS-4.7Meg	
R48	220KΩ	½		BTS-220K	
R49	220KΩ	½		BTS-220K	
R50	47KΩ	½		BTS-47K	
R51	470KΩ	½		BTS-470K	
R52	820Ω	½		BTS-820	
R53	33KΩ	½		BTS-33K	
R54	3300Ω	½		BTS-3300	
R55	500Ω	7		PW7-500	
R56	500Ω	7		PW7-500	
R57	500Ω	7		PW7-500	
R58	68Ω	½		BTS-68	

♦ Items R32, C37A and C37B are combined in one unit.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA David Bogen PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	450VCT	5VAC	6.3VAC	T3116					
	② .44	.049ADC	③ .64A	④ 4.15A						

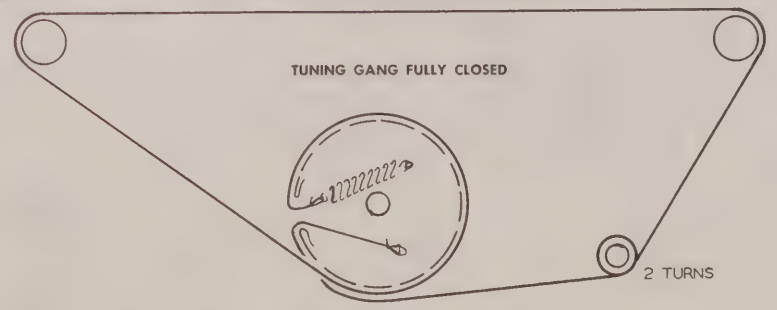
COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA David Bogen PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω		U-402				Tapped
L2	Cathode Choke	.1Ω		U-504	19-1002		4606	2 Microhenries
L3	RF Choke	.8Ω		U-501	19-1000		4602	1 Microhenry; IRC part no. CLA
L4	RF Choke	3Ω		U-507	19-1003		4608	3.3 Microhenries; IRC part no. CLA
L5	FM RF Coil	0Ω		U-401				Tapped
L6	FM Osc. Coil	0Ω		U-403				Tapped
L7	RF Choke	.8Ω		U-501	19-1000		4602	1 Microhenry; IRC part no. CLA
L8	AM Ant. Coil	31Ω*	2.7Ω	U-304				
L9	AM RF Coil	70Ω	2.8Ω	U-301				
L10	AM Osc. Coil	2.1Ω		U-303	14-1060		71-Osc.	Tapped at .2Ω
L11	1st FM IF	.6Ω	.6Ω	H-294	16-3487	FM-254	1463	
L12	1st AM IF	17Ω	17Ω	H-368				
L13	2nd FM IF	.7Ω	.7Ω	H-355	16-3487	FM-254	1463	
L14	2nd AM IF	17Ω	17Ω	H-368				
L15	3rd FM IF	.7Ω	.7Ω	H-355	16-3487	FM-254	1463	
L16	FM Limiter	.6Ω		H-371	16-3487■	FM-254■	1463■	
L17	Discriminator	.6Ω	.8ΩCT	H-295	17-3494			
L18	10KC Filter	115Ω		U-201	19-1576	TV-163	6210	

* Tapped at .1Ω
■ Detune unused winding.

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M1	Dial Light	C619	#47, Bayonet
M2	Dial Light		#47, Bayonet
M3	Tuning Cap.		6 Gang - AM Sections (32-610MMF; 32-610MMF; 30-280MMF)
M4	Switch		Selector (Rotary - Wafer Type)
M5	Switch		Magnetic - Crystal Pickup Selector (DPDT-Slide Type)
M6	Switch		On-Off (AFC) Slide Type



DIAL CORD STRINGING

PHOTOFACT* Folder

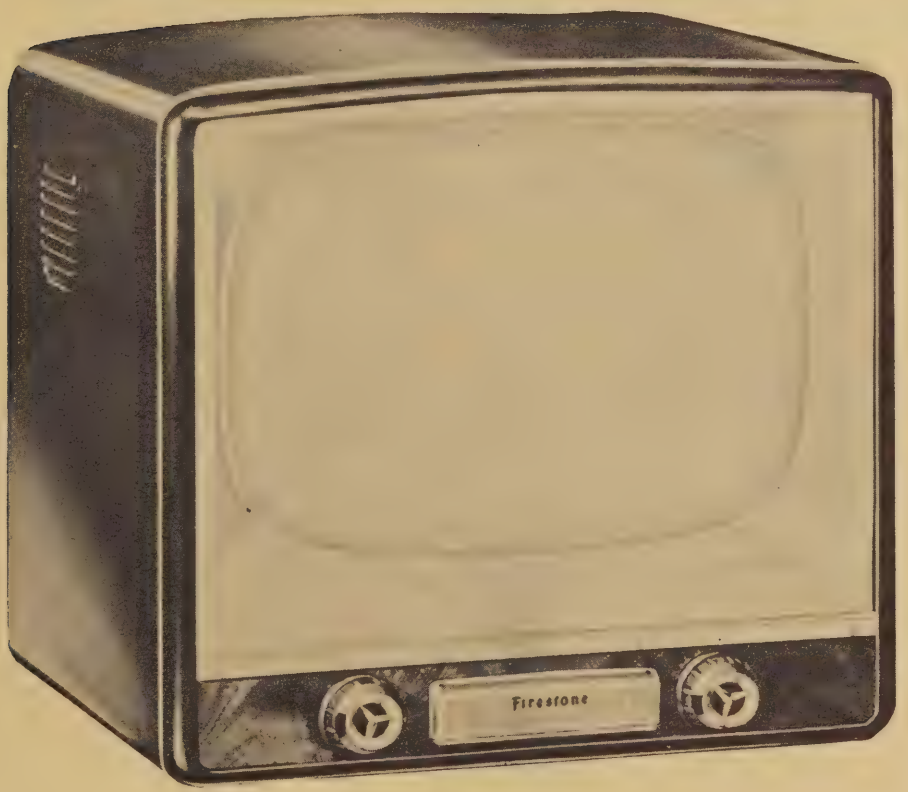
FIRESTONE

MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 13-G-134

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

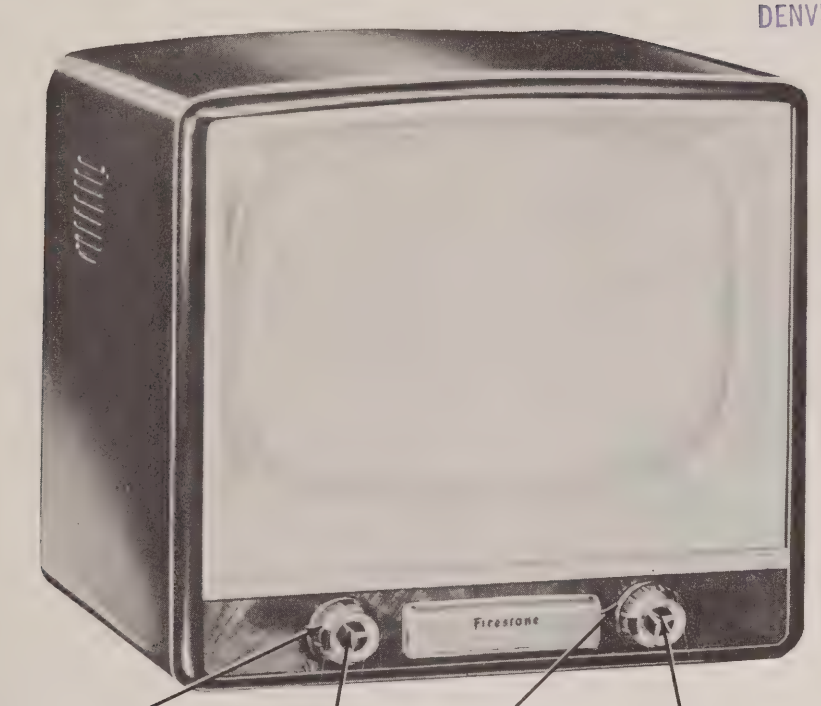
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 5-55 SET 277 FOLDER 4

PHOTOFACT* Folder
*TRADE MARK
RETMA MEMBER

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)



FIRESTONE MODEL 13-G-134

TRADE NAME	Firestone	MODELS	CODE
		13-G-134, 13-G-163	155-4-82210
		13-G-147	15-4-75301
		13-G-148	155-4-82204
		13-G-156	155-4-81786
		13-G-161, 13-G-162	155-4-82209

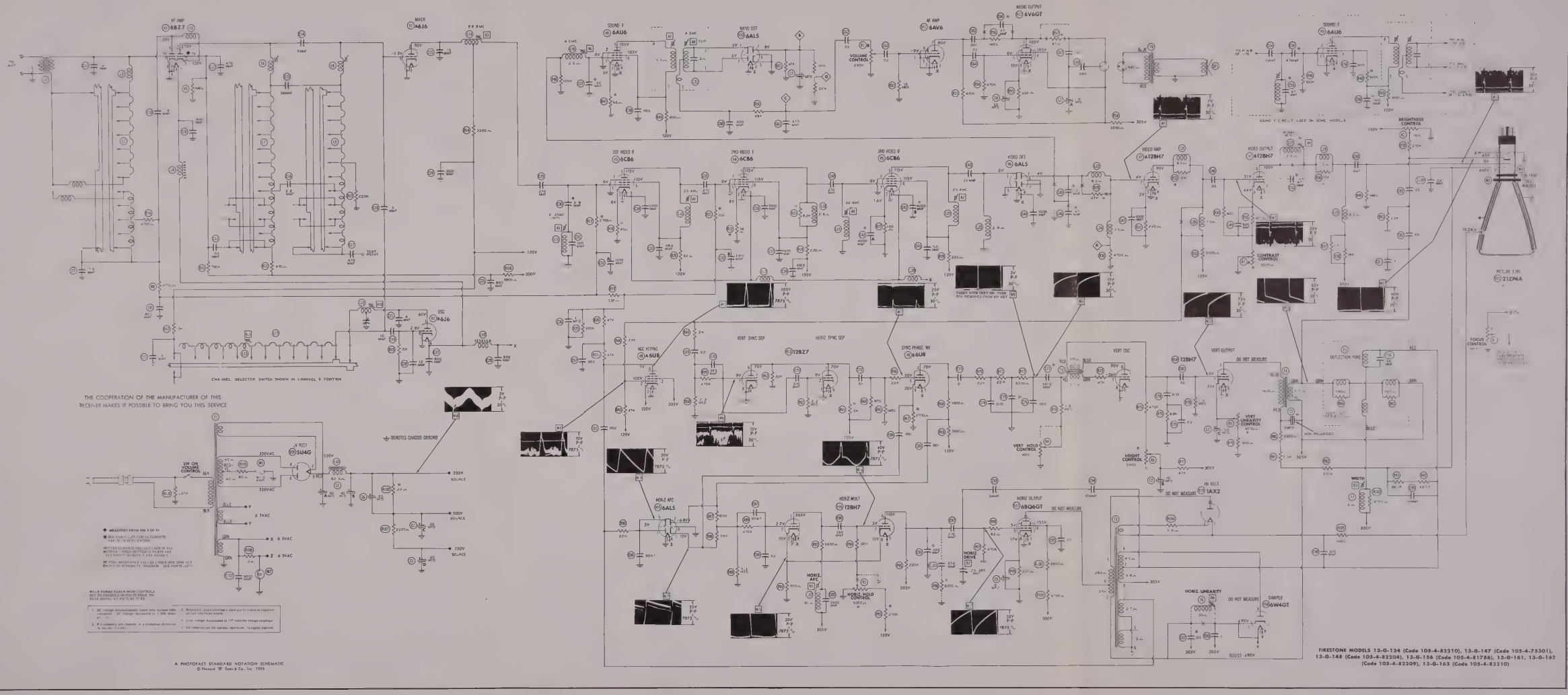
SUPPLIER Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio
TYPE SET Television Receiver
TUBES Twenty-one
POWER SUPPLY 110-120 Volts AC - 60 Cycle RATING 1.84 Amp. @ 117 Volts AC
TUNING RANGE Channels 2 thru 13 VHF, 14 thru 23 UHF, Video IF 25.75MC, Sound IF 21.25MC (Intercarrier)

INDEX

Alignment Instructions 6, 7
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 15 thru 18
Photographs
Cabinet-Rear View 11
Capacitor Identification 4, 9
Chassis-Top View 3
RF Tuner 10
Resistor Identification 13, 20
Photographs (Cont)
Trans., Inductor & Alignment Identification 23
Resistance Measurements 8
Servicing in the Field 22
Schematic (Alternate Tuners) 14, 19, 21
Schematic (TV) 2
Trouble Shooting Aids 12, 21
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

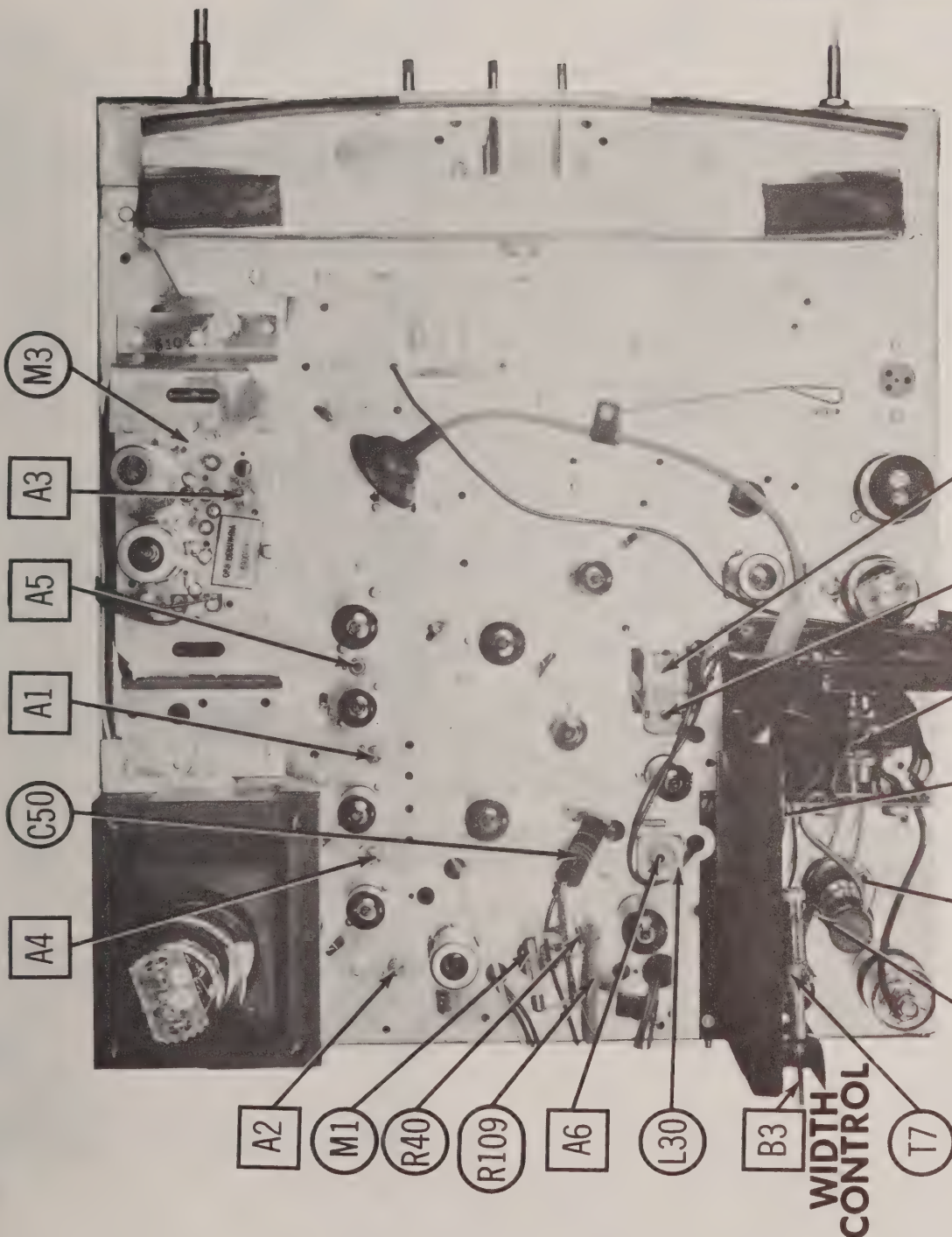
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 3 POSITION
DENOTES CHASSIS GROUND
SW. ON VOLUME CONTROL
B+ RECT 5U4G
330VAC
6.3VAC
305V SOURCE
300V SOURCE
120V SOURCE
SOUND I 6AU6
RATIO DET 6AL5
VOLUME CONTROL 250K
AF AMP 6AV6
AUDIO OUTPUT 6V6GT
1ST VIDEO IF 6CB6
2ND VIDEO IF 6CB6
3RD VIDEO IF 6CB6
VIDEO DET 6AL5
VIDEO AMP 1/2 12BH7
VIDEO OUTPUT 1/2 12BH7
BRIGHTNESS CONTROL
CONTRAST CONTROL
PICTURE TUBE 21ZP4A
FOCUS CONTROL
DEFLECTION YOKE
AGC KEYING 6U8
VERT SYNC SEP
HORIZ SYNC SEP 12BZ7
SYNC PHASE INV 6U8
VERT OSC
VERT OUTPUT 12BH7
VERT HOLD CONTROL
HEIGHT CONTROL
VERT LINEARITY CONTROL
WIDTH
HORIZ AFC 6AL5
HORIZ MULT 12BH7
HORIZ OUTPUT 6BQ6GT
HV RECT 1AX2
HORIZ DRIVE
HORIZ HOLD CONTROL
HORIZ LINEARITY
DAMPER 6W4GT
BOOST +490V
DO NOT MEASURE
TUNER WITH VERT OSC TUBE (TO BE REMOVED FROM BOP KEY)
SOUND II CIRCUIT USED ON SOME MODELS
MEASURED FROM PIN 3 OF V1
SEE PARTS LIST FOR ALTERNATE VALUE IN SOME CHASSIS
DOTTED IN PARTS ARE NOT USED IN ALL MODELS. PRINTED IN PARTS ARE USED IN ALL MODELS. WIRING IS ARE SHOWN
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM. SEE PARTS LIST
MAKE VOLTAGE TAKEN WITH CONTROLS SET TO PRODUCE MAXIMUM SYNC TIP TO PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 cps.
2. Pin numbers are shown in a clockwise direction as viewed from base.
3. Measured from screen grid pin to common negative of the chassis (ground).
4. Line voltage maintained at 117 volts for voltage readings.
5. All readings are for normal operation. No signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210).

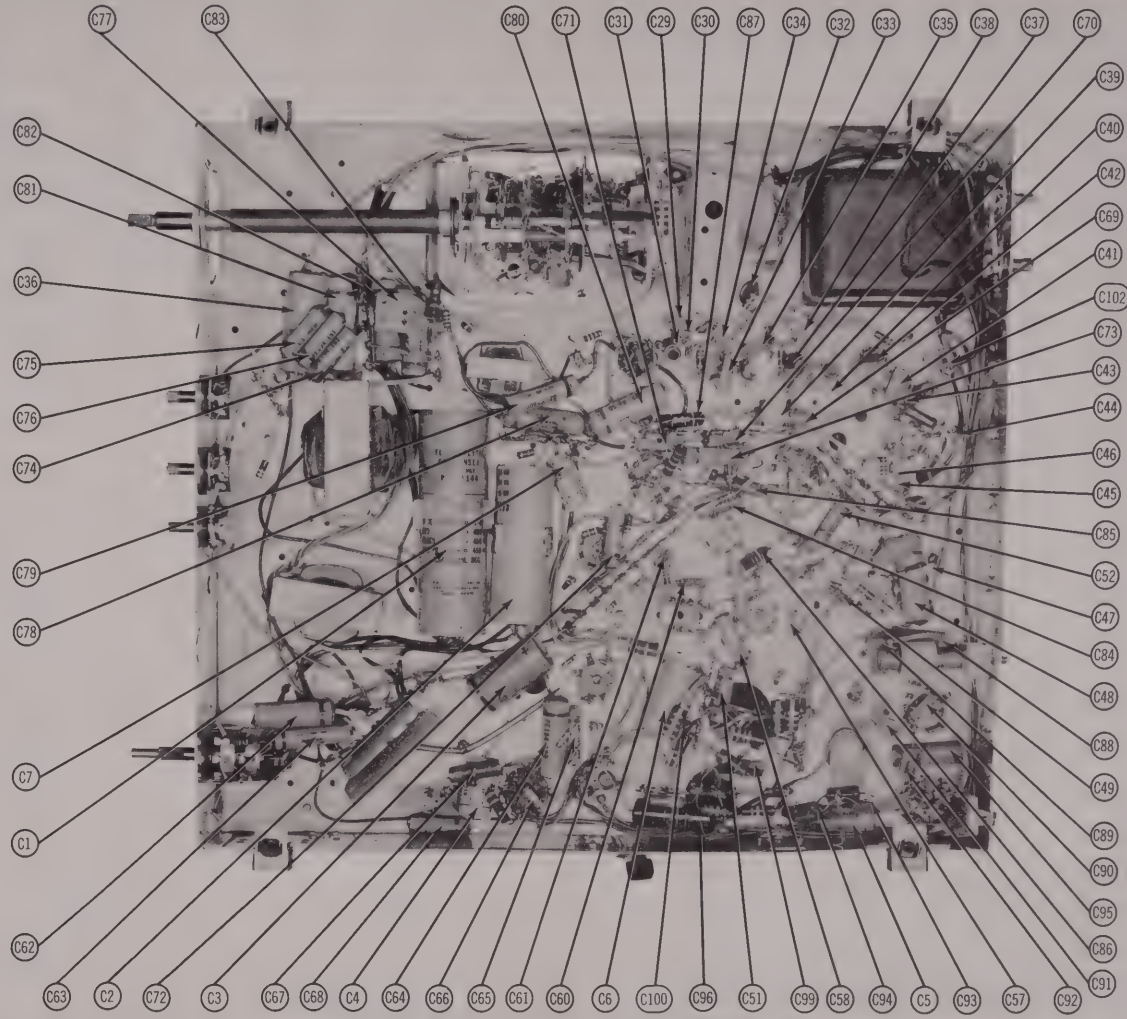
FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210).

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)



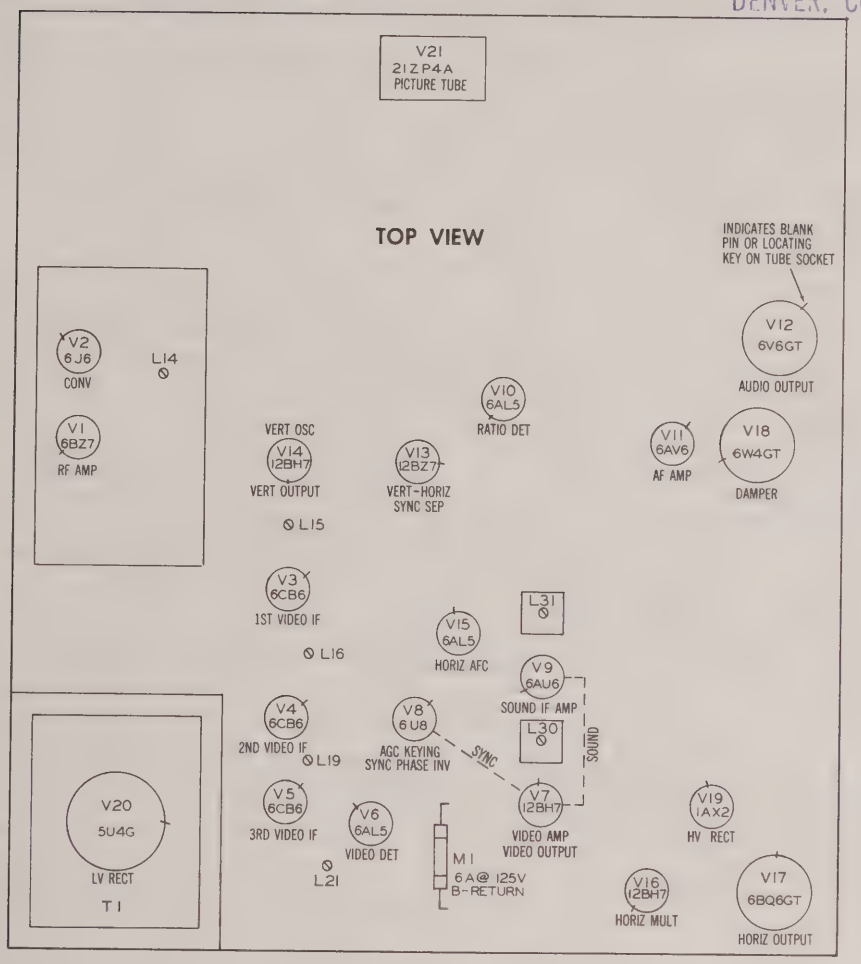
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-73301), 13-G-148 (Code 105-4-82304), 13-G-156 (Code 105-4-81760), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V20, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V8, V21**
Has pic, no sound - **V9, V10, V11, V12**
Overloaded picture - **V8**

SYNC FAILURE
No vert. sync - **V8, V14**
No horiz. sync - **V8, V15, V16**
No vert. or horiz. sync - **V8, V13**

SWEEP FAILURE
No raster, has sound - **V16, V17, V18, V19, V21**
No vertical deflection - **V14**
Poor vert. linearity or foldover - **V14**
Poor horiz. linearity or foldover - **V16, V17, V18**
Narrow picture - **V16, V17, V18, V19, V20**
Vert. off freq. - **V8, V14**
Horiz. off freq. - **V8, V15, V16**

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal output tube (V17) from its socket.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Attenuate generator output to maintain 3 volts at VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.4MC (Unmod)	Any	DC probe thru 10KΩ to point (A). Common to chassis.	A1, A2	Adjust for maximum deflection.
2.	"	"	22.8MC	"	"	A3, A4	"
3.	"	"	21.25MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Attenuate sweep generator output to maintain 5 volts peak to peak vertical deflection on oscilloscope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.25MC 25.75MC	Any	Vert. amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, retouch A1 thru A4 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point D as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.001MFD	High side to pin 2 (grid) of 12BH7 (V7). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A6, A7	Adjust for maximum deflection. Attenuate generator output to maintain less than 10 volts at VTVM.
6.	"	"	"	"	DC probe to point (C). Common to point (D).	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.001MFD	High side to pin 2 (grid) of 12BH7 (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A6, A7	Disconnect stabilizing capacitor C7. Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
6.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A8	Reconnect stabilizing capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.001MFD	High side to pin 2 (grid) of picture tube. Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A9	Adjust for MINIMUM deflection.

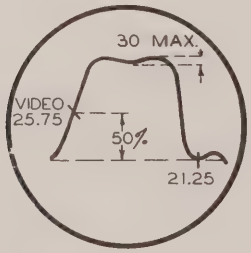


FIG.1

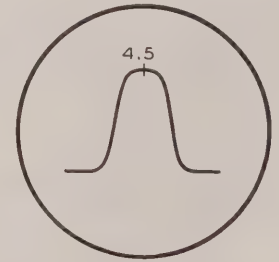


FIG.2

PROPERTY OF
L. F. BLANKENSHIP
3324 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A10	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
9.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check for marker placement as shown in Fig. 4. Retouch A10 if necessary, to bring any individual high band channel within range of the fine tuning control, then recheck all other high band channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
10.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A11	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 50%.
11.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for marker placement as shown in Fig. 4. Retouch A11 if necessary, to bring any individual low band channel within range of the fine tuning control, then recheck all other low band channels to see that they have not been seriously affected.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

VHF RF AND MIXER ALIGNMENT

The VHF RF and Mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF OSCILLATOR ALIGNMENT

Connect the high side of the vertical input of oscilloscope to point (A). Connect the low side to chassis. Connect a UHF signal generator to the UHF antenna terminals.
Turn tuning drum fully counter clockwise and adjust signal generator for a signal between 459MC and 466MC (400∿ Mod.). If necessary, compress or spread the short ends of the oscillator tuning capacitor plates until some frequency within the 459 to 466MC range produces a response on scope.
Turn the tuning drum to its maximum clockwise position and adjust the signal generator for a signal between 894MC and 903MC. If a response below 894MC occurs carefully compress the long ends of the oscillator plates to obtain a response between 894 and 903MC. If a response above 903MC occurs spread the long ends of the oscillator plates slightly.

UHF RF AND MIXER ALIGNMENT

Leave generator and scope connected as under "UHF Oscillator Alignment". Adjust signal generator for a 470MC signal and tune in this signal by turning tuning drum nearly maximum counter clockwise.
Compress or spread the short ends of the plates of the RF and mixer tuning capacitor sections for maximum response on scope.
Adjust signal generator for a 890MC signal and tune in this signal.
Compress or spread the long ends of the plates of the RF and Mixer tuning capacitor sections for maximum response on scope.

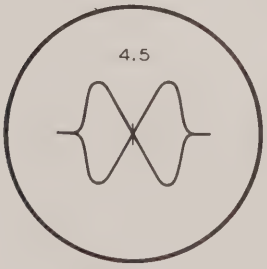


FIG. 3

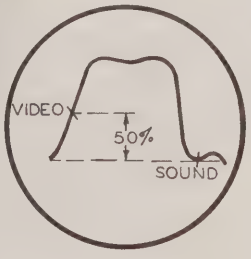
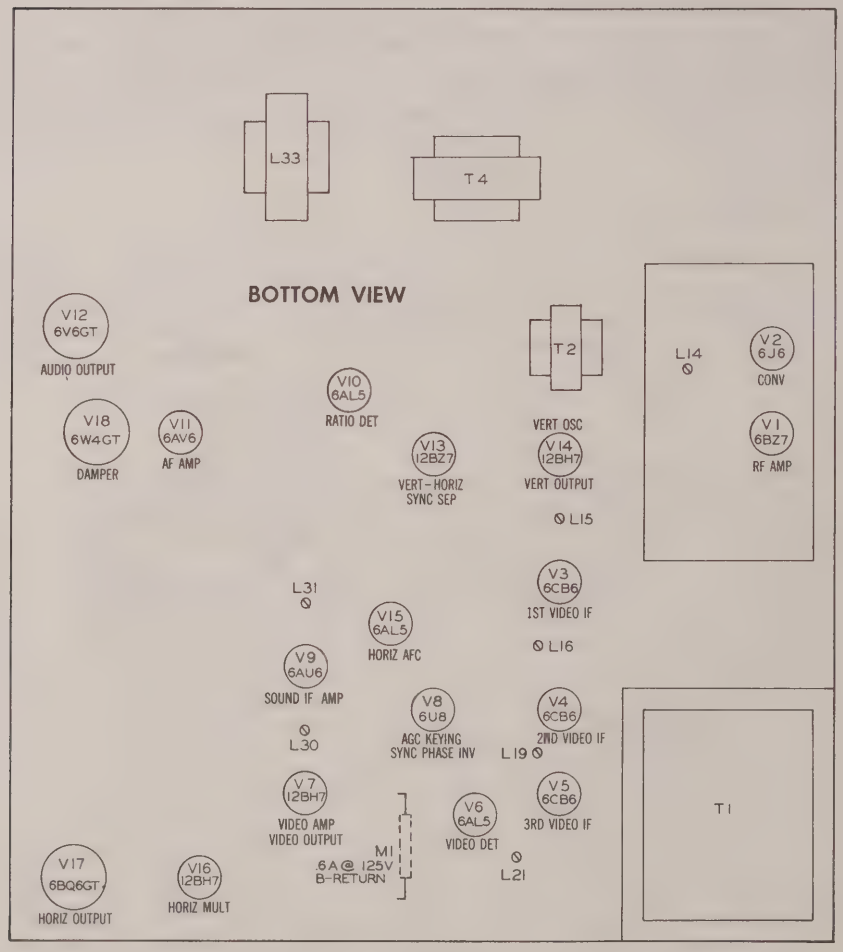


FIG. 4

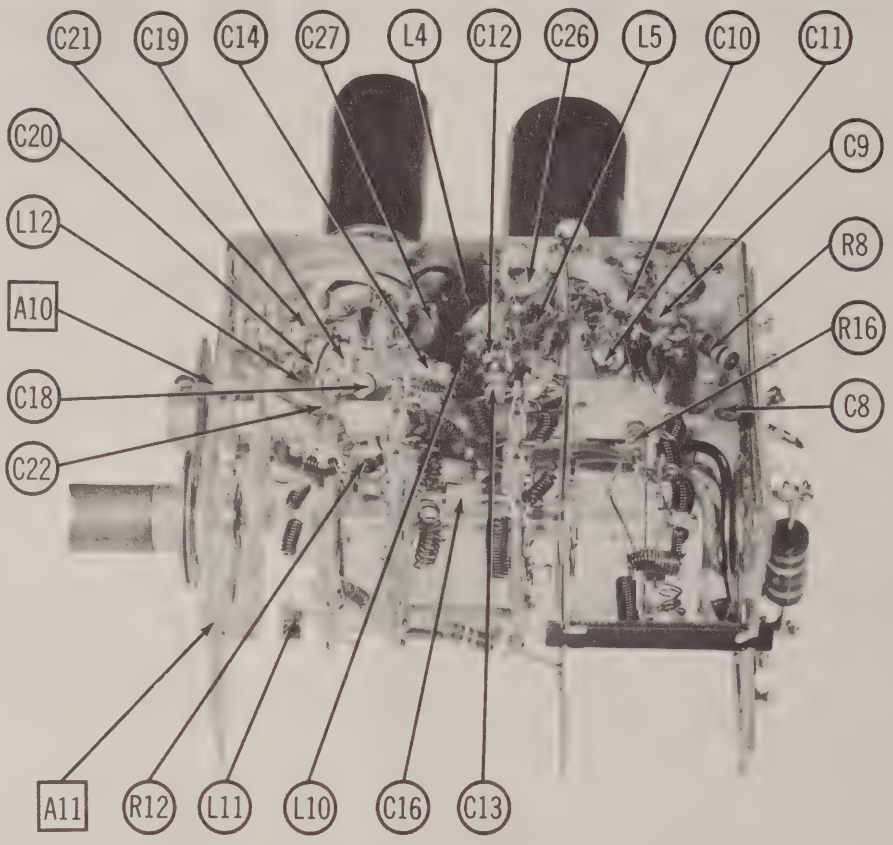
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	† 4. 4KΩ	450KΩ	INF.	0Ω	. 1Ω	INF.	100KΩ	0Ω	0Ω
V 2	6J6	† 12. 4KΩ	† 5. 4KΩ	0Ω	. 1Ω	220KΩ	15KΩ	0Ω		
V 3	6CB6	100KΩ	47Ω	. 1Ω	0Ω	† 2. 4KΩ	† 2. 4KΩ	0Ω		
V 4	6CB6	100KΩ	56Ω	. 1Ω	0Ω	† 2. 4KΩ	† 2. 4KΩ	0Ω		
V 5	6CB6	. 2Ω	150Ω	. 1Ω	0Ω	† 2. 4KΩ	† 2. 4KΩ	0Ω		
V 6	6AL5	2. 8Ω	0Ω	0Ω	. 1Ω	0Ω	0Ω	4. 7KΩ		
V 7	12BH7	† 5. 7KΩ	4. 7KΩ	220Ω	. 1Ω	. 1Ω	† 8KΩ	1. 1Meg	3KΩ	0Ω
V 8	6U8	† 10. 1KΩ	† 25KΩ	† 63Ω	0Ω	. 1Ω	195KΩ	† 2. 3KΩ	2. 7KΩ	600KΩ
V 9	6AU6	100KΩ	0Ω	0Ω	. 1Ω	† 3. 1KΩ	† 3. 1KΩ	68Ω		
V 10	6AL5	INF.	INF.	. 1Ω	0Ω	0Ω	0Ω	47KΩ		
V 11	6AV6	10 Meg	0Ω	. 1Ω	0Ω	0Ω	0Ω	† 470KΩ		
V 12	6V6GT	INF.	0Ω	† 3. 5KΩ	† 3. 3KΩ	470KΩ	† 1 Meg	. 1Ω	330Ω	
V 13	12BZ7	† 15KΩ	2. 2Meg	0Ω	0Ω	0Ω	† 15KΩ	2. 7Meg	0Ω	. 1Ω
V 14	12BH7	▲10KΩ	1. 5Meg	3KΩ	0Ω	0Ω	† 3. 5Meg	3 Meg	0Ω	. 1Ω
V 15	6AL5	3. 4Meg	3. 4Meg	0Ω	. 1Ω	22KΩ	0Ω	22KΩ		
V 16	12BH7	† 5. 7KΩ	3. 8Meg	1. 8KΩ	. 1Ω	. 1Ω	† 220KΩ	120KΩ	1. 8KΩ	0Ω
V 17	6BQ6GT	470KΩ	0Ω	INF.	† 11. 6KΩ	470KΩ	INF.	. 1Ω	220Ω	TOP CAP ▲ 57Ω
V 18	6W4GT	† 65Ω		250KΩ		† 80Ω	INF.	250KΩ	250KΩ	
V 19	1AX2	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 347Ω
V 20	5U4G	INF.	20KΩ	INF.	100Ω	INF.	100Ω	INF.	20KΩ	
V 21	21ZP4A	0Ω	1 Meg	PIN 10 ▲ 330KΩ	PIN 11 † 140KΩ	PIN 12 . 1Ω			20KΩ	

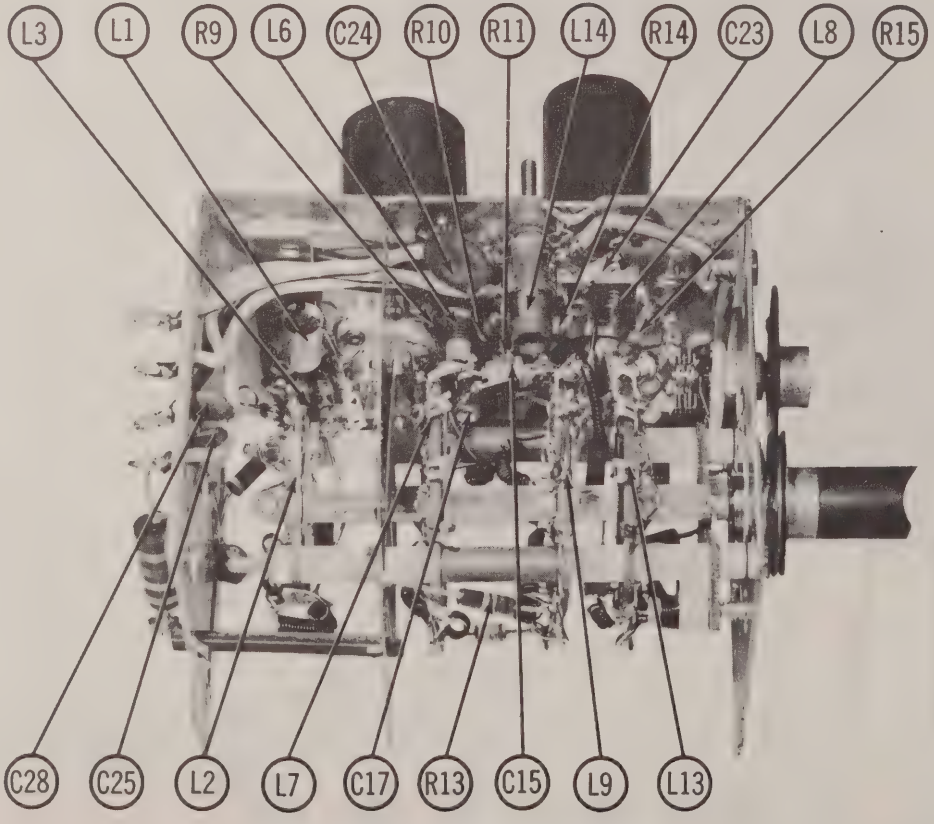
† MEASURED FROM PIN 8 OF V20.
▲ MEASURED FROM PIN 3 OF V18.



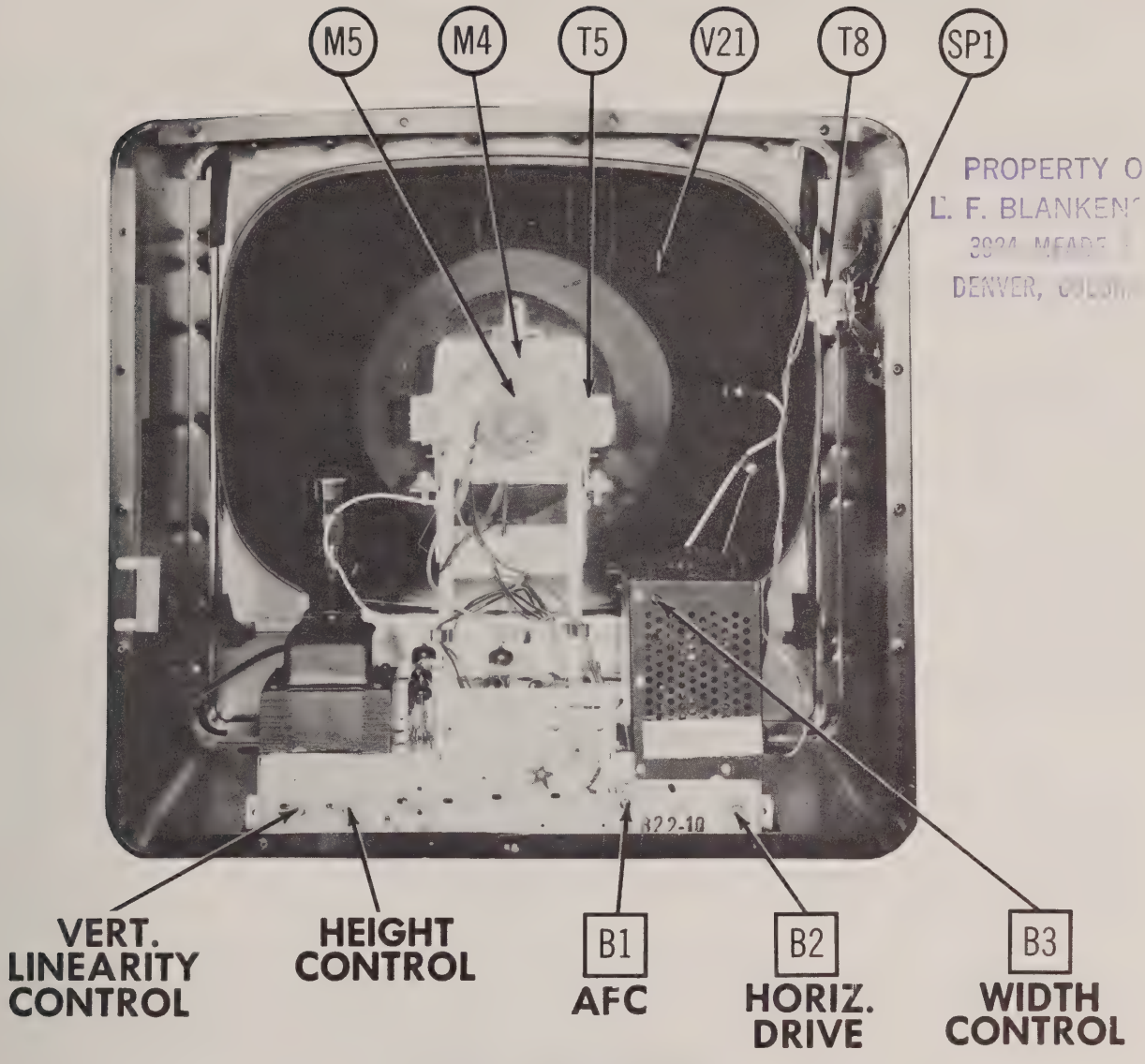
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



PROPERTY OF
L. F. BLANKEN
3924 MEADE
DENVER, COLO.

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to its mid-range position and adjust the horizontal AFC slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B2) in a counter clockwise direction as far as possible without the presence of vertical white lines or compression near the center of the picture.

Adjust the width slug (B3) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B4) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check adjustments B2 and B3. Adjust B4 if incorporated in set. Check by substitution V17 and V18. Check R100, R101, C92, C95 and other associated components.

DRIVE LINES

Adjust B2. Check by substitution V17 and V18. Check C92, C5, R97, R100, R101 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V17 and V18. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16, V17 and V18. Check C88 for open. Check T3, T5A,, L32, C9, R91 and associated components.

XMAS TREE EFFECT

Check by substitution V16, V17 and V18. Check T3 and T5A for internal arcing. Check L32, C89, C90, C92 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R81, R80 and other associated components.	Check T2, R77, R6, R76, C80 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V14. Check height and vertical linearity control for proper operation. Check T4, T5B, C2B, C2C and other associated components.

COMPRESSED AT BOTTOM

Substitute V14. Check R77, R6, R76, C2B and other associated components.

COMPRESSED AT TOP

Substitute V14. Check C2C, R79, R5, T4 and other associated components.

FOLDS

Substitute V14. Check C78, C79, R75 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check V13 and V8. Check R45, R61, R69, R68, C72, C69, C70 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check T2, C77, R74, R4 and other associated components.	Check vertical integrator network. Check video IF alignment for overloading.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V15 and V16. Check horizontal AFC network for component failure or change of value. Check L32, C89.

HORIZONTAL BENDING

Check by substitution V8, V13, V15 and V16. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check C48, C50, R38, R37, L29, R33, L25 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check C48, C50 L28, L25, L23 contrast control, picture tube and other associated components. Check video detector network.

NEGATIVE PICTURE

Substitute V7. Check picture tube, L24, R35, R31, C47, C49 and other associated components. Check AGC network.

SMEAR

Substitute V7. Check L22, L23, L24, L25, L28, R36, C50 and other associated components. Check video IF alignment.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11 and V12. Check stages V11 and V12 using audio signal generator. Apply audio signal across R1B.

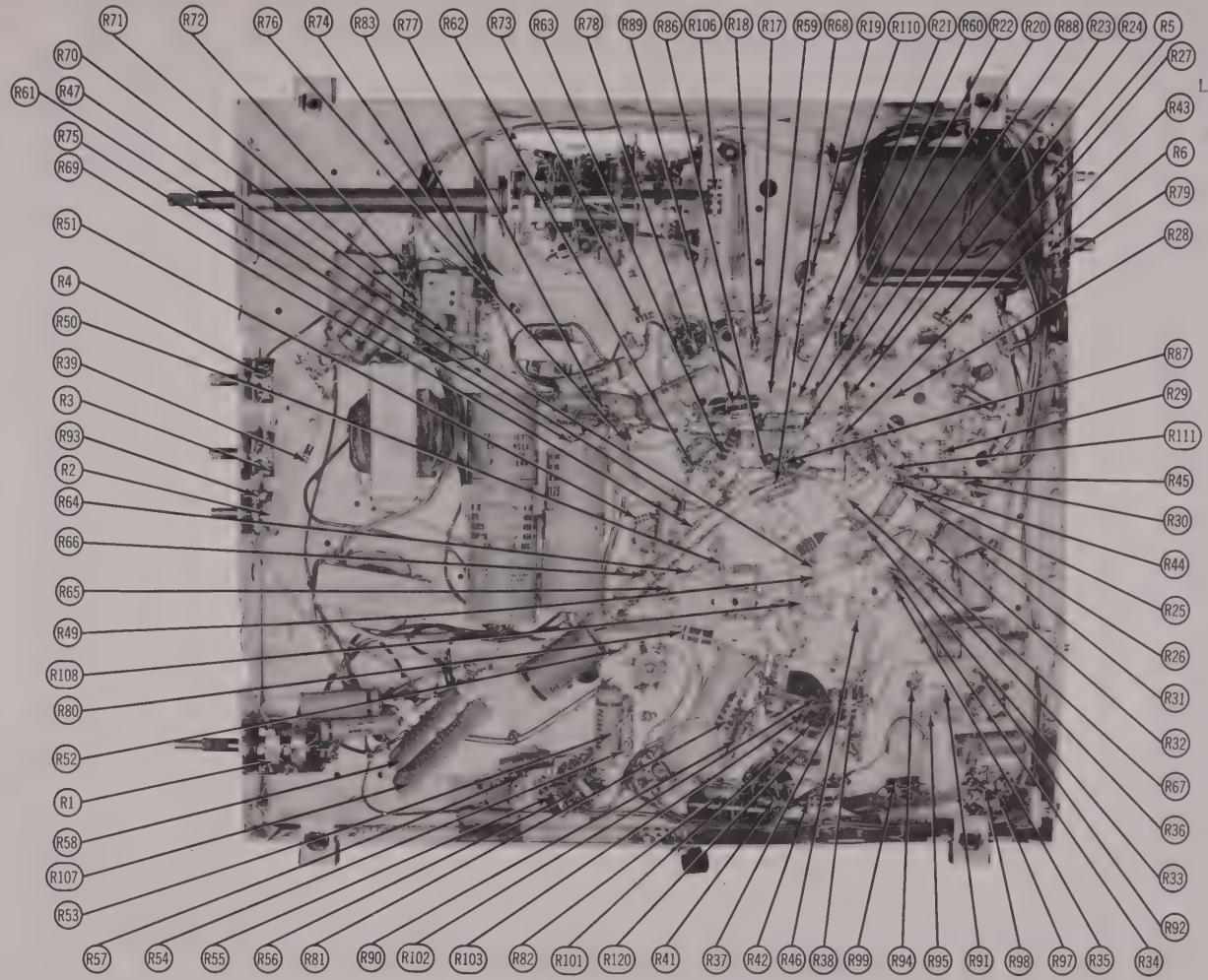
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C63, C64, C67, C4, R58, R53, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

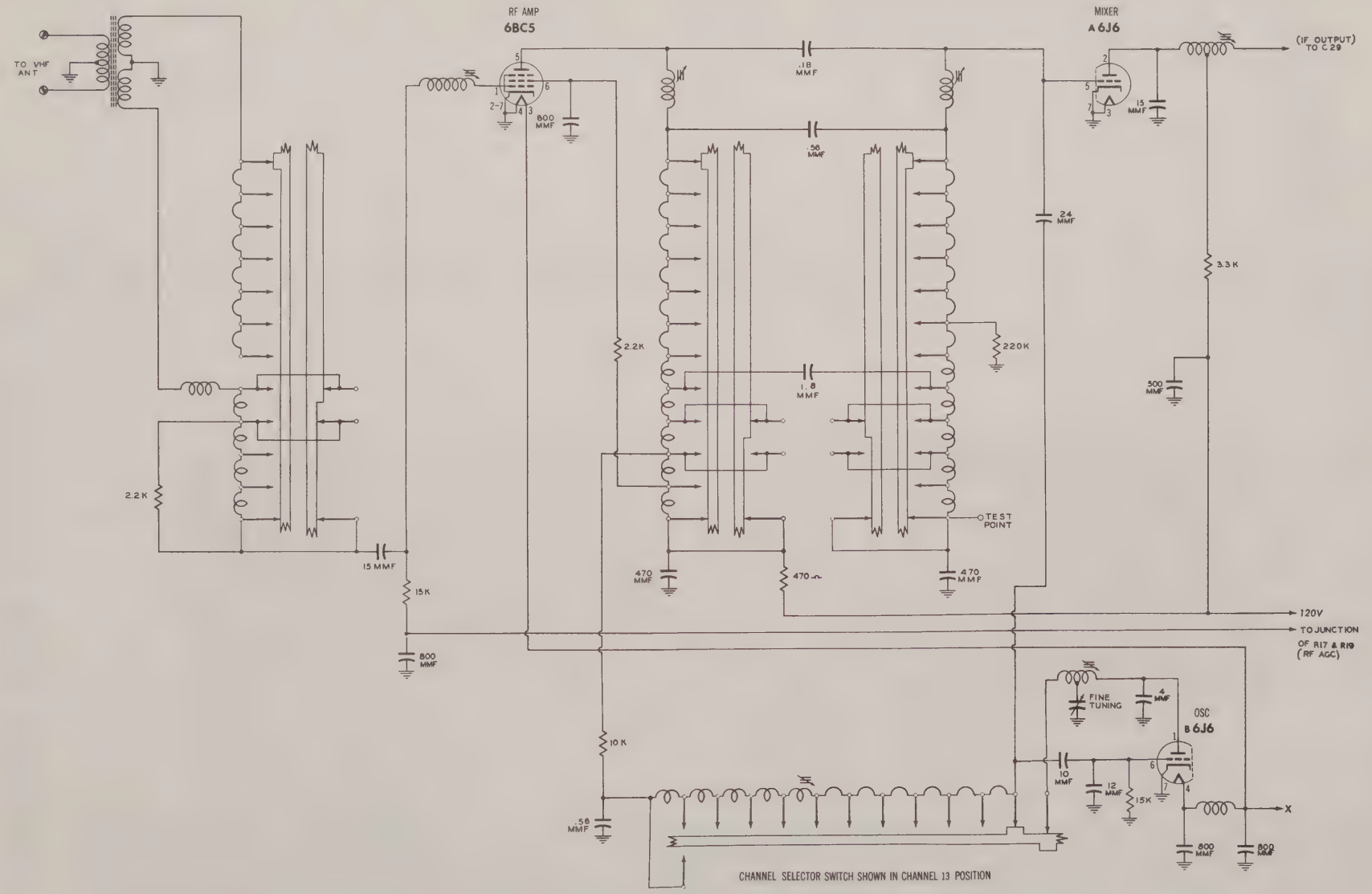
Follow procedure outlined under "Weak or No Sound".



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FIRESTONE MODELS 13-G-134 (Code 103-4-82210), 13-G-147 (Code 103-4-75301), 13-G-148 (Code 103-4-82204), 13-G-156 (Code 103-4-81786), 13-G-161, 13-G-162 (Code 103-4-82209), 13-G-163 (Code 103-4-82210)



ALTERNATE VHF TUNER PART NO. 541339A

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1954

ALTERNATE VHF TUNER SCHEMATIC

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Detector	6AL5	6AL5	6BT	
V7	Video Amp. - Video Output	12BH7	12BH7	9A	
V8	AGC Keying-Sync Phase Inv.	6U8	6U8	9AE	
V9	Sound IF Amplifier	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amplifier	6AV6	6AV6	7BT	
V12	Audio Output	6V6GT	6V6GT	7S	
V13	Horiz. Sync Sep. - Vert. Sync Sep.	12BZ7	12BZ7	9AJ	
V14	Vert. Oscillator-Vert. Output	12BH7	12BH7	9A	
V15	Horiz. AFC	6AL5	6AL5	6BT	
V16	Horiz. Mult	12BH7	12BH7	9A	
V17	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rectifier	1AX2	1AX2	9Y	
V20	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3984 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	FIRESTONE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V21	21ZP4A	21ZP4A	21ZP4A	21ZP4A	21ZP4A	12N	① Aluminized
		21ZP4B ①		21ZP4B ①	21ZP4B ①	12N	② Circuit changes necessary
				21ZP4 ②		12D	
	17HP4	17HP4	17HP4	17HP4 / 17RP4	17HP4	12L / 12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	450	21000301			2N537	TDL-D40-450	D235	Red
B	40	450				TCD75	TDL-D20-450	FMD-4520	Blue
C	20	450							Orange
D	20	450							Green
C2A	10	450	21000491			TCD72	TDL-D10-450	FMD-4510	Red
B	10	450				TC3501	TD-100-50	MTH-5010	Blue
C	100	50							Yellow
C3	5	350	21000481			TC62		FM-3512 *	Note 1
						TC62 *		FM-3512	
C4	50	25	21000531			TC29	TD-50-25	FM-0250	
C5	10	25	21000251			TC22	TD-10-25	FM-0210	
C6	25	12	21000331			TC26	TD-25-25	FM-0225	
C7	1	100	21000521			TC40	TD-4-150	FM-1504	
C8	800			DD-801	801-001	DC-521			
C9	7.5								
C10	1.8								
C11	4								
C12	470								
C13	100			D6-101	GP1K-101	UC-531			
C14	.3								
C15	.56								
C16	2.2			TCZ-2.2	NP0K-2R2				
C17	470			D6-471	GP2K-471	UC-5347			
C18	.3								
C19	10			TCN-10	N750K-100	NT-541			
C20	12								
C21	4								
C22	.5								
C23	15			TCZ-15	NP0K-150	ZT-5415			
C24	5000			DD-502	811-005	DC-525			
C25	800			DD-801	801-001	DC-521			
C26	800			DD-801	801-001	DC-521			
C27	800			DD-801	801-001	DC-521			
C28	800			DD-801	801-001	DC-521			
C29	270	500				MCB241		KR-1327	
C30	3.9								Note 2
C31	100	500				MCB235		KR-1310	
C32A	1500			DD2-152	822-0015	DCD-5215		C-1215	
B	1500							C-1215	
C33	680	500						KR-1368	
C34	5000			DD-502	811-005	DC-525		C-1250	
C35	270	500				MC241		KR-1327	
C36	1.0	100				PT41	CT2-1	330210	
C37	1500			DD-152	801-0015	DC-5215		C-1215	
C38	5000			DD-502	811-005	DC-525		C-1250	
C39	5000			DD-502	811-005	DC-525		C-1250	
C40	270	500				MCB241		KR-1327	
C41	510	500						KR-1351	
C42A	4000			DD2-502	822-004	DCD-524		C-1240	Note 3
B	4000							C-1240	Note 3
C43	22	500				MCB220		KR-1422	
C44	5000			DD-502	811-005	DC-525		C-1250	
C45	15			D6-150	GP1K-150	UC-5415		K-1415	Note 4
C46	47			D6-470	GP1K-470	UC-5447		K-1447	Note 5
C47	1000			D6-102	GP2L-102	UC-521		K-1210	
C48	.05	600		DF-503		PT615	IMP6-S5	330615	
C49	820			D6-821	GP2K-821			K-1382	
C50	.047	600		DF-503		PT615	IMP6-S47	330647	
C51	.002	600		D6-202	GP2-333-202	PT622	IMP6-D2	330622	
C52	.002	600		D6-202	GP2-333-202	PT622	IMP6-D2	330622	
C53	47			TCZ-47	NP0K-470	ZT-5447		KR-1447	Note 5

PROPERTY
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA FIRESTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C54	5			TCZ-4-7	NPOK-050	2T-555		KR-1550	Note 5
C55	47			TCZ-47	NPOK-470	2T-5447		KR-1647	Note 5
C56	47			TCZ-47	NPOK-470	2T-5447		KR-1647	Note 5
C57	22			TCZ-22	NPOK-220	2T-5422		KR-1622	Note 5
C58	.005	600		D6-502	GP2-333-502	PT8ES	DMP6-D6	330625	
C59	1500			DD-152	[illegible]	DC-5315		C-1315	Note 5
C60	1000			D6-102	GP2L-102	UC-521		K-1310	
C61	470			D6-471	GP2K-471	UC-5347		K-1347	
C62	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C63	.02	600		DF-203	817-02	PT8IS	DMP6-S3	330612	
C64	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C65	.001	600		D6-102	GP2L-102	PT8ES	DMP6-D1	330631	
C66	47			D6-470	GP1K-470	UC-5447		K-1447	Note 5
C67	.001	600		D6-102	GP2L-102	PT8ES	DMP6-D1	330631	
C68	.005	600		D6-502	GP2-333-502	PT8ES	DMP6-D5	330625	
C69	.02	600		DF-203	817-02	PT8IS	DMP6-S3	330612	
C70	390	500				MC8243		KR-1339	
C71	270	500				MC8241		KR-1327	
C72	.01	600		D6-103	GP2-333-103	PT6U	DMP6-S1	330611	
C73	.01	600		D6-103	GP2-333-103	PT8ES	DMP6-S1	330611	
C74	.005	600		D6-502	GP2-333-502	PT8ES	DMP6-D5	330625	
C75	.01	600		D6-103	GP2-333-103	PT8ES	DMP6-S1	330611	
C76	.005	600		DF-503	GP2-333-502	PT8ES	DMP6-D5	330625	
C77	5600	500						CR-1256	Note 8
C78	.035	600							
C79	.02	600		DF-203	817-02	PT8IS	DMP6-S3	330612	
C80	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C81	1	600		DF-104		PT8IS	DMP6-P1	330601	
C82	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C83	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C84	.001	600		D6-102	GP2L-102	PT8ES	DMP6-D1	330631	
C85	.001	600		D6-102	GP2L-102	PT8ES	DMP6-D1	330631	
C86	.0047	600		D6-472	GP2-333-472	PT8ES	DMP6-D47	3306247	
C87	.0047	600		D6-472	GP2-333-472	PT8ES	DMP6-D47	3306247	
C88	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C89	3900	500				MC8463		CR-1239	
C90	390	500				MC8243		KR-1339	
C91	390	500				MC8243		KR-1339	Note 7
C92	270	500				MC8241		KR-1327	
C93	5	2500		DD30-4R7	3KV-4R7	MC9550		K-9450	
C94	10	2500		DD30-100	3KV-100	MCP400		K-9410	
C95	.05	600		DF-503		PT8IS	DMP6-S5	330615	
C96	.1	600				PT8U	DMP6-P1	330601	
C97	.05	600				PT8IS	DMP6-S5	330615	Note 5
C98	500	20000		TV3-502	413	HV20035A			
C99	10	2500		DD30-100	3KV-100	MCP400		K-9410	
C100	22	1500		DD30-220	1R5KV-220	MCM422		K-5422	
C101	56								
C102	5000			DD-502	[illegible]	DC-525		C-1250	
C103	130								Note 5

* To replace original unit, connect negative terminals together, and positive terminals to circuit.
Note 1. Non-polarized unit. Replace with same type.
Note 2. Some models use 5MMF in this application.
Note 3. In some models, C43A and C43B is a dual 5000MMF
Note 4. Some models use 10MMF in this application
Note 5. Not used in all versions.
Note 6. Some versions use 4700MMF in this application
Note 7. When C103 is used C91 is 270MMF.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	5000Ω	2	36000361	* QJ-503	RTV-3B		WP53 UR24AA † US-24	Contrast-panel-wire wound-
B	250KΩ	½					EU-41	Volume-Rear
C	Switch						EU-42	Attach to R1B
R2A	100KΩ	½	36000181	QU-128	A47-100K-S	AB-40	EU-41	Brightness
B	Shaft		Not Req.	Not Req.	RS-3	AK-1	Not Req.	Attach to R2A
R3A	3000Ω	½	3600037	QU-114	A47-3000-S	AB-30	EU-44	Horiz. Hold
B	Shaft		Not Req.	Not Req.	RS-3	AK-1	Not Req.	Attach to R3A
R4A	1 Meg	½	36000311	QU-137	A47-1Meg-S	AB-89	EU-34	Vert. Hold
B	Shaft		Not Req.	Not Req.	RS-3	AK-1	Not Req.	Attach to R4A
R5A	30000	½	3600231		A47-3000-S	AB-8	EU-8	Vert. linearity
B	Shaft		Not Req.		FS3-1/4	AK-1	Not Req.	Attach to R5A
R6A	5 Meg	½	36000301	QU-141	A47-5Meg-S	AB-87	EU-87	Height
B	Shaft		Not Req.	Not Req.	FS3-1/4	AK-1	Not Req.	Attach to R6A
R7	1 Meg	½	3600231					Focus

† Universal replacement (Mallory exact duplicate part no. UE-505WS).
* CONCENTRIKIT EQUIVALENT: KIT K-3, BASE ELEMENTS & SHAFTS: W17-1/4 & P3-1/4 (PANEL)
B13-130 & R1-130 (REAR) & SWITCH 76-L

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	NOTES
R8	4700Ω	½		BTS-4700	
R9	1 Meg 5%	½		BTS-1 Meg5%	
R10	750KΩ	½		BTS-750K	
R11	470Ω	½		BTS-470	
R12	10KΩ	½		BTS-10K	
R13	220KΩ	½		BTS-220K	
R14	3300Ω	½		BTS-3300	
R15	1 KΩ	½		BTS-1K	
R16	47000Ω	½		BTS-47000	
R17	27000Ω	½		BTS-27000	Note 1
R18	470	½		BTS-47	Note 2
R19	330Ω	½		BTS-330	
R20	82Ω	½		BTS-82	
R21	10KΩ	½		BTS-10K	Note 3

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	NOTES
R22	58Ω	½		BTS-56	Note 4
R23	8200Ω	½		BTS-8200	Note 5
R24	220Ω	½		BTS-220	
R25	100KΩ	½		BTS-100K	
R26	47KΩ	½		BTS-47K	
R27	150Ω	½		BTS-150	
R28	220Ω	½		BTS-220	
R29	27KΩ	½		BTS-27K	Note 6
R30	47000Ω	½		BTS-47000	
R31	220Ω	½		BTS-220	
R32	10KΩ	½		BTS-10K	Note 7
R33	3300Ω	1			
R34	1 Meg	½		BTS-1 Meg	
R35	180Ω	½		BTS-180	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	NOTES
R36	10KΩ	1		BTS-15K	Note 8
R37	11KΩ 5%	2			
R39	18KΩ	2			
R39	270KΩ	½		BTS-270K	
R40	1 Meg	½		BTA-1 Meg	
R41	680KΩ	½		BTA-680K	
R42	680KΩ	½		BTA-680K	
R43	47KΩ	½		BTS-47K	
R44	33KΩ	½		BTS-33K	
R45	12KΩ	½		BTS-12K	
R46	100KΩ	½		BTS-100K	
R47	68Ω	½		BTS-68	Note 6
R48	100KΩ	½		BTS-100K	Note 6
R49	1800Ω	½		BTS-1800	
R50	33KΩ	½		BTS-33K	
R51	47KΩ	½		BTS-47K	
R52	10 Meg	½		BTS-10 Meg	
R53	470KΩ	½		BTS-470K	
R54	470KΩ	½		BTS-470K	
R55	33KΩ	½		BTA-33K	
R56	1 Meg	½		BTS-1 Meg	Note 9
R57	47Ω	½		BTS-47	Note 6
R58	3250Ω	7			
R59	470KΩ	½		BTS-470K	
R60	2.2Meg	½		BTS-2.2Meg	
R61	15KΩ	½		BTS 15K	Note 10
R62	2.2Meg	½		BTS-2.2Meg	
R63	22KΩ	½		BTA-22K	
R64	1 Meg	½		BTS-1 Meg	
R65	1 Meg	½		BTS-1 Meg	
R66	22KΩ	½		BTS-22K	
R67	2700Ω	½		BTS-2700	Note 10
R68	3900Ω	½		BTS 3900	
R69	3900Ω	½		BTS-3900	
R70	22KΩ	½		BTS-22K	
R71	22KΩ	½		BTS-22K	
R72	8200Ω	½		BTS-8200	
R73	47KΩ	½		BTS-47K	
R74	1.8Meg 5%	1		BTA-1.8Meg 5%	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	IRC PART No.	NOTES
R75	680Ω	1		BTS 6800	
R76	470KΩ	½		BTS 470K	
R77	47KΩ	½		BTS-47K	
R78	1.5Meg	½		BTS-1.5Meg	
R79	1800Ω	1		BTS 1800	
R80	3300Ω	1		BTS-3300	
R81	3300Ω	2		BTA-3300	
R82	330KΩ	1		BTA-330K	
R83	33KΩ	½		BTS-33K	
R84	560Ω	1		BTS-560	
R85	560Ω	1		BTS-560	
R86	100KΩ	½		BTS-100K	
R87	100KΩ	½		BTS-100K	
R88	2.2Meg	½		BTS-2.2Meg	
R89	470KΩ	½		BTS-470K	
R90	22KΩ	1		BTA-22K	
R91	1800Ω	1		BTS-1800	
R92	5600Ω	1		BTS-5600	
R93	270KΩ	½		BTS-270K	Note 6
R94	100KΩ	½		BTS-100K	
R95	220KΩ	½		BTS-220K	
R96	82000Ω	1		BTS-82000	Note 6
R97	470KΩ	½		BTS-470K	
R98	82Ω	2		BTS-82	
R99	220Ω	2		BTB-220	
R100	6800Ω	2		BTB-6800	
R101	4700Ω	2		BTB-4700	
R102	22Ω	3		BTB-22	Note 13
R103	4700Ω	3		BTB-4700	
R104	0.1Ω	1			
R105	1 Meg	2		BTB-1 Meg	
R106	39000Ω	3		BTB-3900	
R107	22500Ω	15			
R108	1.2Ω	1			
R109	600Ω	10			
R110	220KΩ	1		BTA-220K	
R111	47KΩ	1		BTA-47K	
R112	6800Ω	2		BTB-6800	Note 6
R113	6800Ω	2		BTB-6800	Note 6
R114	39000Ω	3		BTB-3900	Note 11

Note 1. Some models may use a 3900Ω resistor in this application.
Note 2. Some models may use a 33Ω resistor in this application.
Note 3 Some models may use a 18KΩ resistor in this application.
Note 4. Some models may use a 47Ω resistor in this application.
Note 5 Some models may use a 56KΩ resistor in this application.
Note 6. Not used in all models.
Note 7. Some models may use a 4700Ω resistor in this application.
Note 8. Some models may use a 10KΩ resistor in this application.
Note 9. Some models may use a 560KΩ resistor in this application.
Note 10. Some models may use a 8200Ω resistor in this application.
Note 11. Used only when UHF tuner part #PC-541652 is used.
Note 12. Some models use 47Ω in this application.

TRANSFORMER (POWER)

ITEM No	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC 1.84A	580VCT .240ADC	5VAC 3A	10000071	P-8171	P-3069	R-49B8			26R20
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC 2A	6.3VAC 1A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	10000065	B6702	A-3003	209T1 ①	V405	A-8135	24A87 ①	A-97X
T3	Horiz. Output Trans.	12000092 or 12000092	FB40*	HVU-27*		X075*	A-8231*	F1.Y-58*	D-33*
T4	Vert. Output Trans.	10000133	Z1808 ③	A-3039 ②	226T1 ②	V313 ③	Z-8141 ②	26S64 ③	A-104X ②
T5A	Yoke-Horiz. (8.5MH)	1800036 or	DT601 ③	MDF-70 ③	206D1 ④	Y70F08 ③	DY-8A ③	Y-5	Y-12-1
B	Vert. (42MH)	1800038							
T6	Horiz.Lin.Coil (3.6-23MH)	A-28222 ④	RF800 ② ④	MWC-4 ② ④	215R1	202R10 ⑦	WC-5 ⑦ ④	WC-14	WC-H ⑦ ④
T7	Width Coil (3.1-7MH)	A-28218-1 ④ A-28279-1 ④		MWC-3 ② ④	206R1	202R4	WC-7	WC-33 ⑦	WC-13 ⑦ ④

① Drill new mounting hole(s).
② Connect blue lead of trans. to plate, connect green lead of trans. to brown lead of yoke. Remove green lead of yoke from its present terminal and connect it and red lead of transformer to boosted B+.
③ Connect horiz. damping network across terminals #1 & #2. Use original network if necessary.
④ Use original yoke network.
⑤ Remove damping capacitor from terms #3 & #7. Use original horiz. network if necessary.
⑥ Not used in all chassis.
⑦ Enlarge mounting hole.
⑧ Connect to terms #1 & #2.
⑨ Connect to coded red and blue terms.
⑩ Alternate width coil.
⑪ Connect to coded green and red terms.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	Hi-volt Rect. Plate Lead						
3	3	3	3	3	3	3	3
9	8	8	8	8	8	8	8
2	4	2	2	2	2	2	1
8	8	4	4	4	4	4	4
7	6	7	7	7	7	7	5
8	7	8	8	8	8	8	6
1	1	1	1	1	1	1	7
5 NC	NC	NC	NC	NC	NC	NC	NC
6 11	8	6	6	6	6	6	8

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	4.95KΩ	3.2Ω	Part of Spkr.	A-3877 ①	A-3026	S-3X ↓	Z1000 ①	24S51 ①	↓ Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	REPLACEMENT DATA FIRESTONE PART No.	JENSEN PART No	QUAM PART No	NOTES
SP1	5"	PM	3.2Ω	7300001 ↓	ST-105 Mod. P5-X	5A1	① Models 13-G-147, 13-G-134, 13-G-163, 13-G-156 & 13-G-148 ↓ Dual set used in model 13-G-163.
	5"	PM	3.2Ω	7300031 ②			② Model 13-G-161.
	5"	PM	3.2Ω	7300022 ③			③ Model 13-G-161.
	8"	PM	3.2Ω	7300071 ③	ST-125 Mod. P8-V	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No	NOTES
L1	Ant. Trans.	0Ω	0Ω					
L2	Ant. Coils	0Ω						
L3	Ant. Coil	0Ω						Channel 13 position
L4	Fil. Choke	0Ω						
L5	Neut. Coil	0Ω						
L6	RF Coil	0Ω						Channel 13 position
L7	RF Coils	0Ω						
L8	Mixer grid coil	0Ω						Channel 13 position
L9	Mixer grid coils	0Ω						
L10	Fil. Choke	0Ω						
L11	Osc. Coil	0Ω						Channel 6 position
L12	Osc. Coil	0Ω						Channel 13 position
L13	Osc. Coils	0Ω						
L14	1st Video IF	.5Ω						
L15	2L 2.5MC Trap	0Ω			20-1021 *●		TV-150 *■	6182 *■
L16	2nd Video IF	.1Ω		13000231	19-1003 ■		TV-102 ■	6188 ■
L17	Fil. Choke	.27Ω			19-3001		TV-189	6175
L18	RF Choke	2.8Ω		18000021	19-3096		TV-180	6178
L19	3rd Video IF	.1Ω		13000231	17-1004		TV-103 ●	6189 ●
L20	Fil. Choke	.27Ω			19-3001		TV-189	6175
L21	4th Video IF	.1Ω		13000231	17-1003		TV-102 ■	6188 ■
L22	RF Choke	2.8Ω			19-3096		TV-180	6178
L23	Series Peaking coil	.5Ω			19-3180		TV-184	6154
L24	Shunt Peaking Coil	7.5Ω			19-3135		TV-181	6153
L25	Series Peaking Coil	.5Ω			19-3180		TV-184	6154
L26	Shunt Peaking Coil	7.5Ω			19-3125		TV-181	6153
L27	4.5MC Trap	2.6Ω		18000191	20-1004		TV-151	1469
L28	Series Peaking Coil	.5Ω			19-3135		TV-181	6153
L29	Shunt Peaking Coil	8.5Ω			19-3300			6155
L30	Sound IF	2.6Ω		18000191	20-1004		TV-151	1469
L31	Horiz. Det.	5.5Ω	.9DCT	13000801	19-1007		TV-115	6305
L32	Horiz. Osc.	60Ω			19-1576		TV-163	6310

* Use trap winding only.
● Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L33	.240ADC	62.5Ω	1.74 Hy.	14000031	C-3325 ①	C-3991 ①	C-33X ①	C5037 ↓	26C44 ↓

↓ Drill one new mounting hole.

FIRESTONE MODELS 13-G-134 (Code 103-4-82710), 13-G-147 (Code 103-4-75301), 13-G-148 (Code 103-4-82709), 13-G-156 (Code 103-4-81786), 13-G-161, 13-G-163 (Code 103-4-82709), 13-G-163 (Code 103-4-82710)

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FIRESTONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG P/T Slo/Blo	6/10A 125V			315.600 (6/10A-3AG-S/B P/T		MDV 6/10	

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M2	Dial Light		#47, Bayonet (Not used in all versions)
M3	Tuner	541339A	VHF (17" Chassis) Pentode Type
	Tuner	541339A	VHF (17" Chassis - Rear Control Sets) Pentode Type
	Tuner	541229	VHF (21" Chassis - Front Control Sets) Cascode Type
	Tuner	541336	VHF - Cascode Type
	Tuner	541508	VHF - Cascode Type
	Tuner	541335	UHF
	Tuner	541452	UHF
M4A	Focus Magnet	19000091	Includes Centering Device (21" Chassis Only)
B	Centering Magnet		Part of Deflection Yoke (17" Chassis Only)
M5A	Ion Trap	19000081	21" Chassis
B	Ion Trap	19000021	17" Chassis
B2	Trimmer Cap.	25000011	Horiz. Drive (25-280MMF)
	Cabinet	70000491	Model 13-G-147 - Ebony Metal (Table Model)
	Cabinet	70000601	Model 13-G-163 - Mahogany Wood (Table Model)
	Cabinet	70000541	Model 13-G-134 - Mahogany Metal (Table Model)
	Cabinet	70000661	Model 13-G-162 - Ebony Metal (Table Model)
	Cabinet	70000371	Model 13-G-161 - Mahogany Wood (Console Model)
	Cabinet	70000631	Model 13-G-156 - Cherry Metal (Table Model)
	Cabinet	70000512	Model 13-G-148 Mahogany Metal (Table Model)
	Knob	76000742	Channel Selector - Models 13-G-147, 13-G-162
	Knob	76000741	Channel Selector - Models 13-G-163, 13-G-134, 13-G-161
	Knob	76000701	Channel Selector - Models 13-G-156, 13-G-148
	Knob	76000732	Off-On-Volume - Models 13-G-147, 13-G-162
	Knob	76000731	Off-On-Volume - Models 13-G-163, 13-G-134, 13-G-161, 13-G-156, 13-G-148
	Knob	76000711	Fine Tuning
	Knob	76000721	Contrast
	UHF Indicator Disc	76001191	Models 13-G-156, 13-G-148
	UHF Indicator Disc	76001201	Models 13-G-156, 13-G-148

ALTERNATE VHF TUNER SCHEMATIC

FIRESTONE MODELS 13-G-134 (Code 105-4-82210), 13-G-147 (Code 105-4-75301), 13-G-148 (Code 105-4-82204), 13-G-156 (Code 105-4-81786), 13-G-161, 13-G-162 (Code 105-4-82209), 13-G-163 (Code 105-4-82210)

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF F. BLANK
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V20. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V20. Check B+ filter and decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check waveform W17. Check M1 fuse.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C96, C97, C95, R101, R100 and other associated components.	Check C90, C92, C89, L32, R92, R95, R91 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V18 and V20. Check R100, R101, T3, T5A and other associated components.

BLOOMING

Check by substitution V17, V18, V19 and V20. Check B+ filter and decoupling network. Check T3, T5A and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check video IF components.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

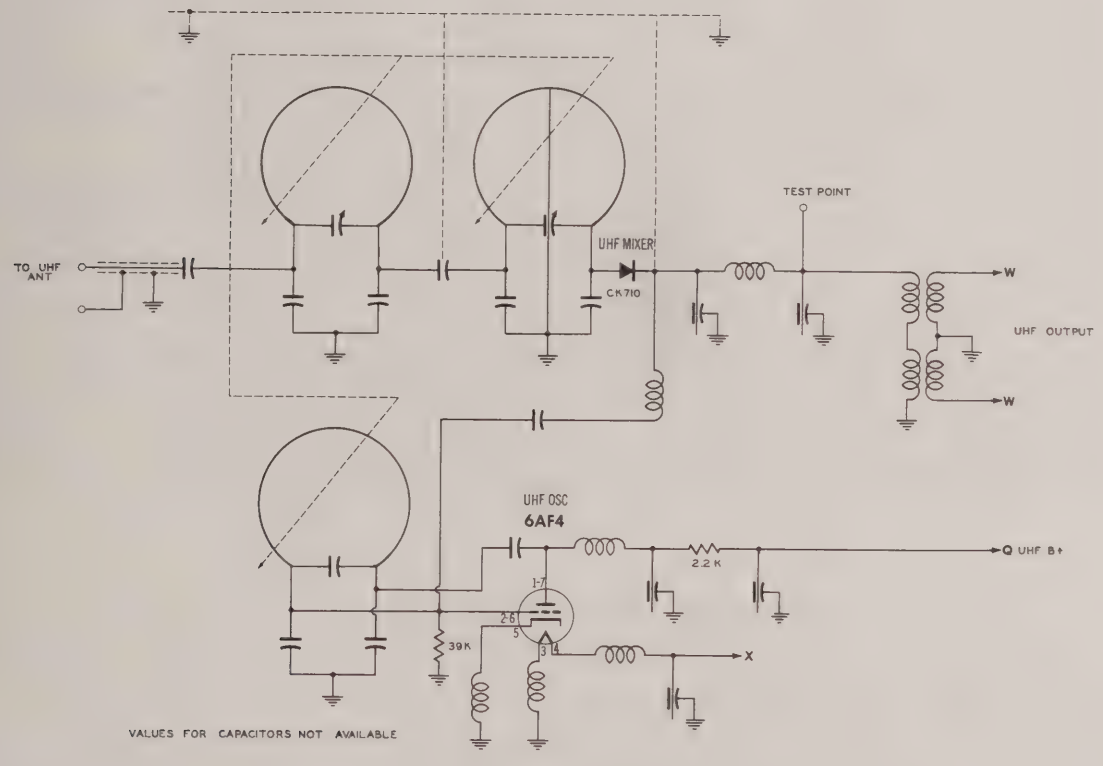
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF TUNER PART NO. 51452 USED WITH
VHF TUNER PART NO. 541336

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1954

UHF SCHEMATIC

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning knobs.

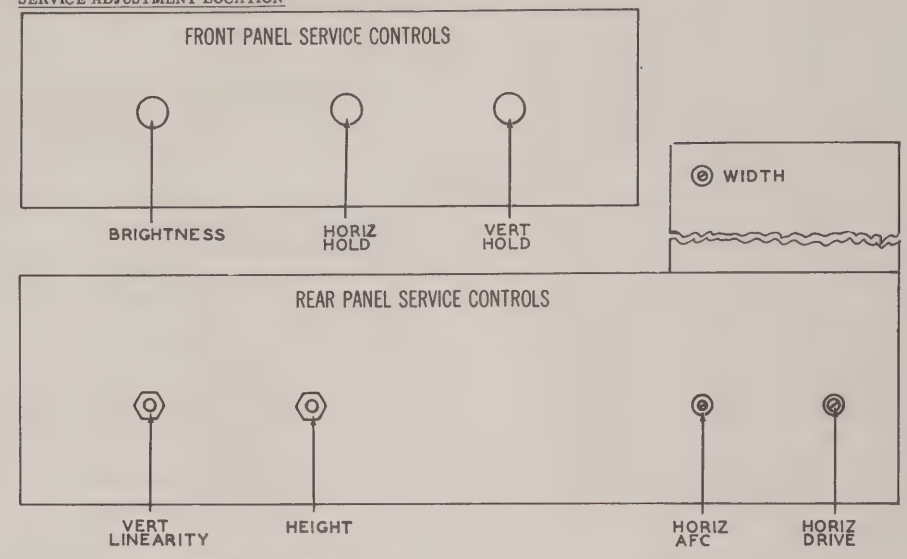
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 metal screws from lower safety glass molding. Remove molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

Remove safety glass and mask. Remove 1 bolt from front picture tube mount. Remove rear cover, and disconnect tube socket, Ion trap, and H. V. lead. Remove picture tube.

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the Horiz. Oscillator Circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. AFC slug L32 until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary L31 located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for L. V. Power Supply protection. (For location see Tube Placement Chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

Remove 4 push-on type control knobs from front panel.

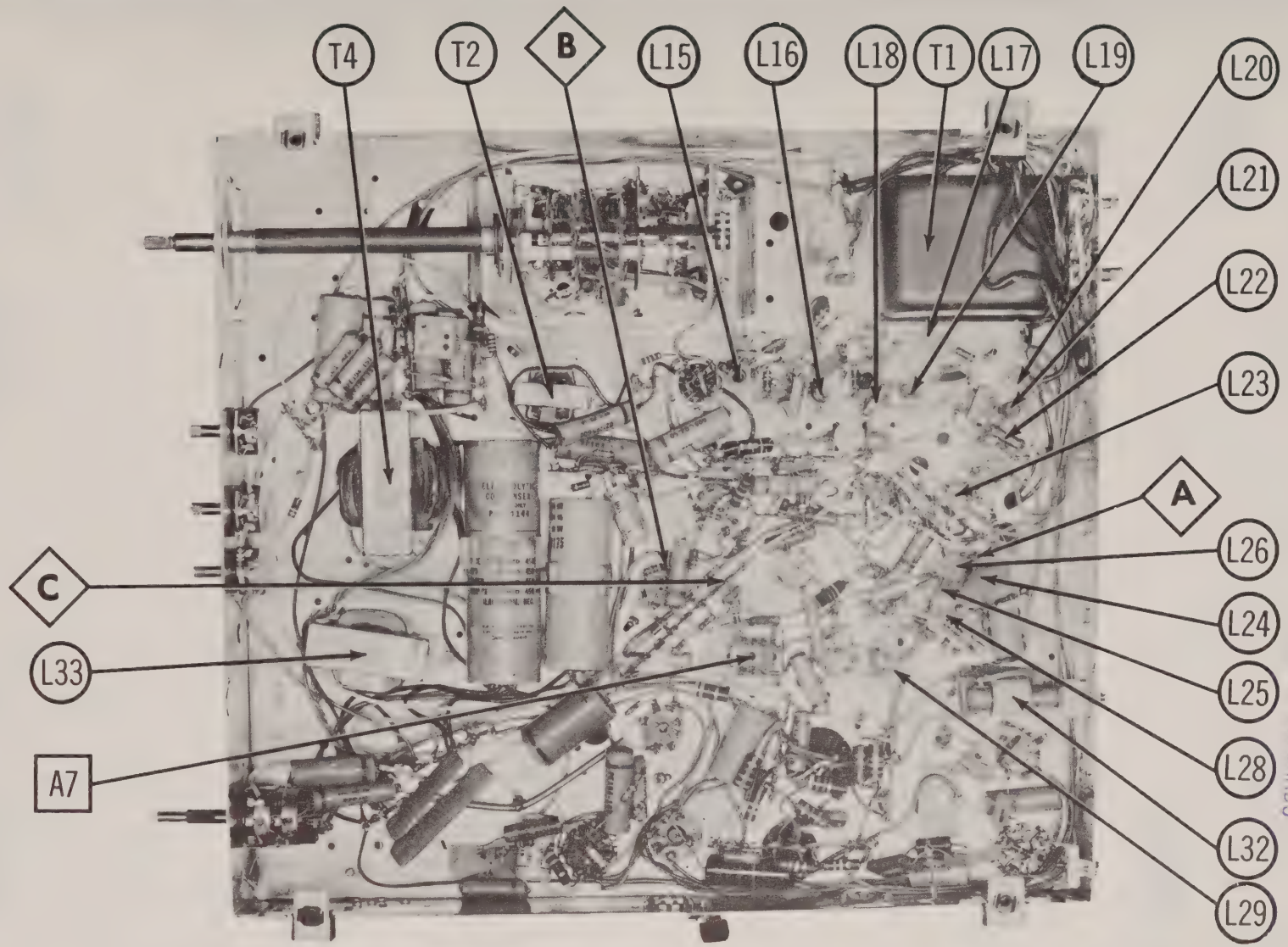
Remove 17 metal screws. Remove cover.

Disconnect speaker leads.

Remove 2 speaker nuts. Remove speaker.

Remove 2 metal screws. Remove antenna bracket.

Remove 6 chassis bolts. Remove chassis.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

FISHER
MODEL FM-80

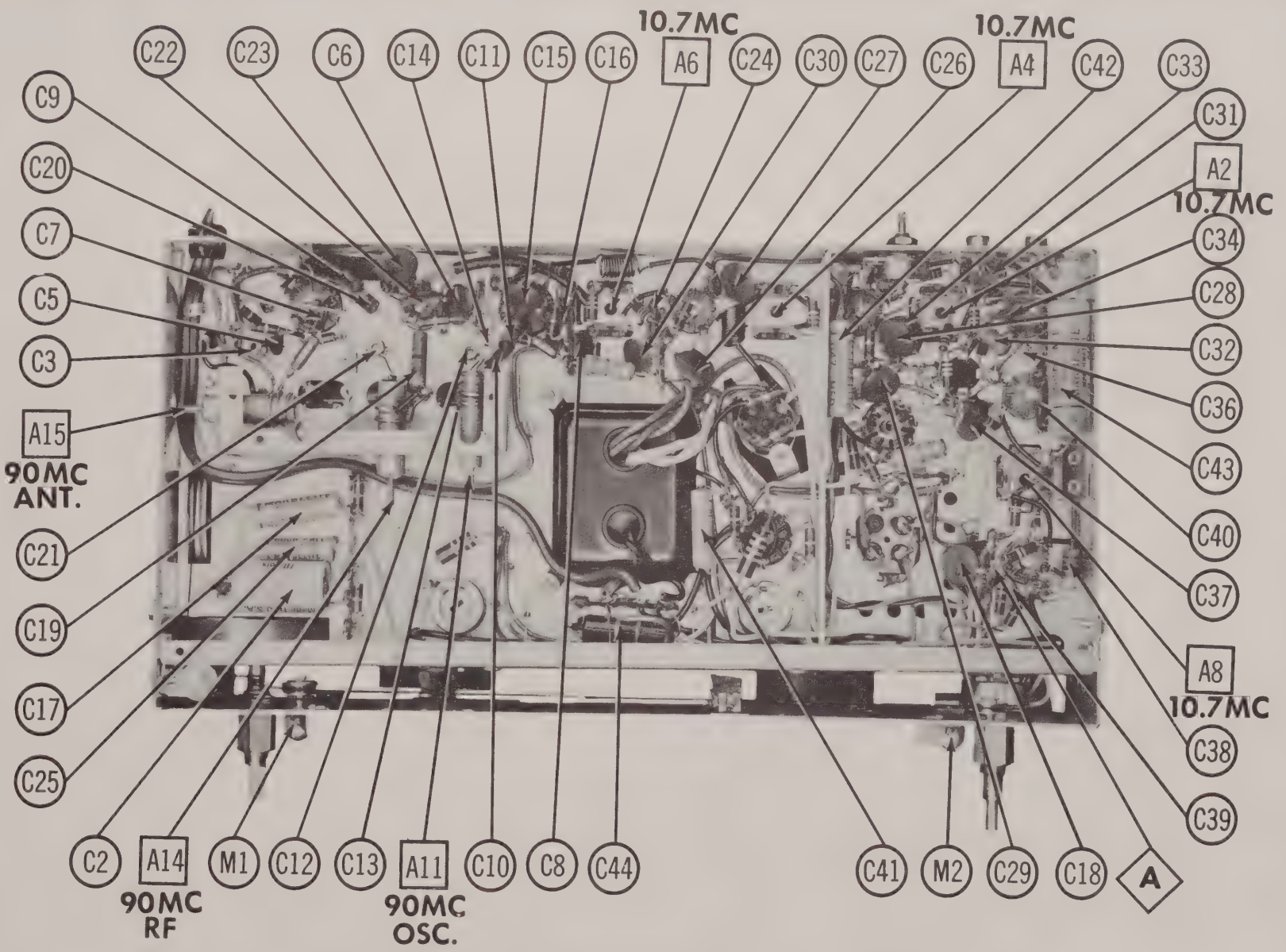
PROPERTY OF
L. F. BLANKENSHIP,
3924 MEADE ST.
DENVER, COLORADO

FISHER
MODEL FM-80

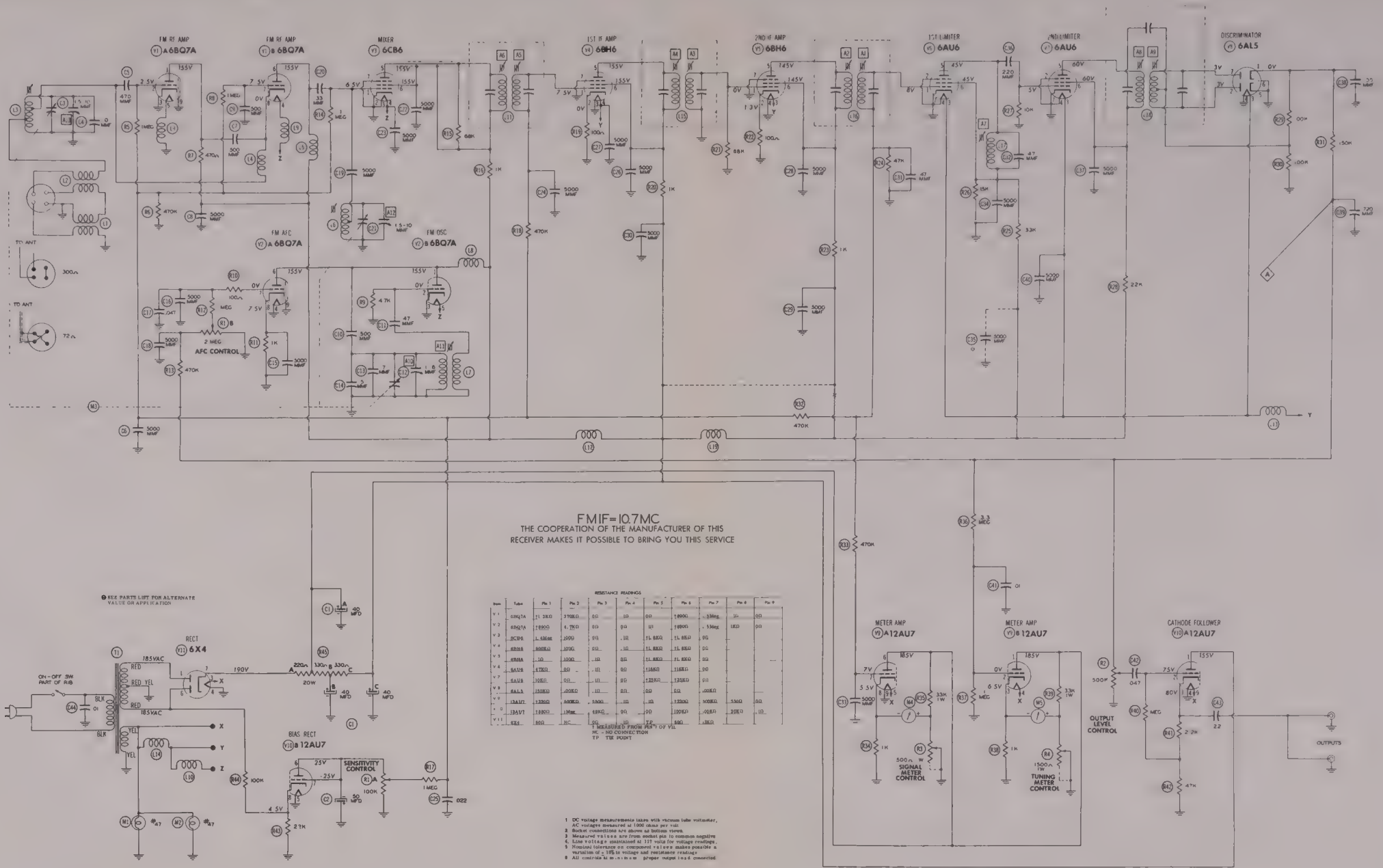
TRADE NAME	Fisher Model FM-80	
MANUFACTURER	Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.	
TYPE SET	AC Operated FM Superheterodyne Tuner For Custom Installation	
TUBES	Eleven	
POWER SUPPLY	105-125 Volts AC - 50/60 Cycles	RATING .43 Amp. @ 117 Volts AC
TUNING RANGE - FM	88MC - 108MC	

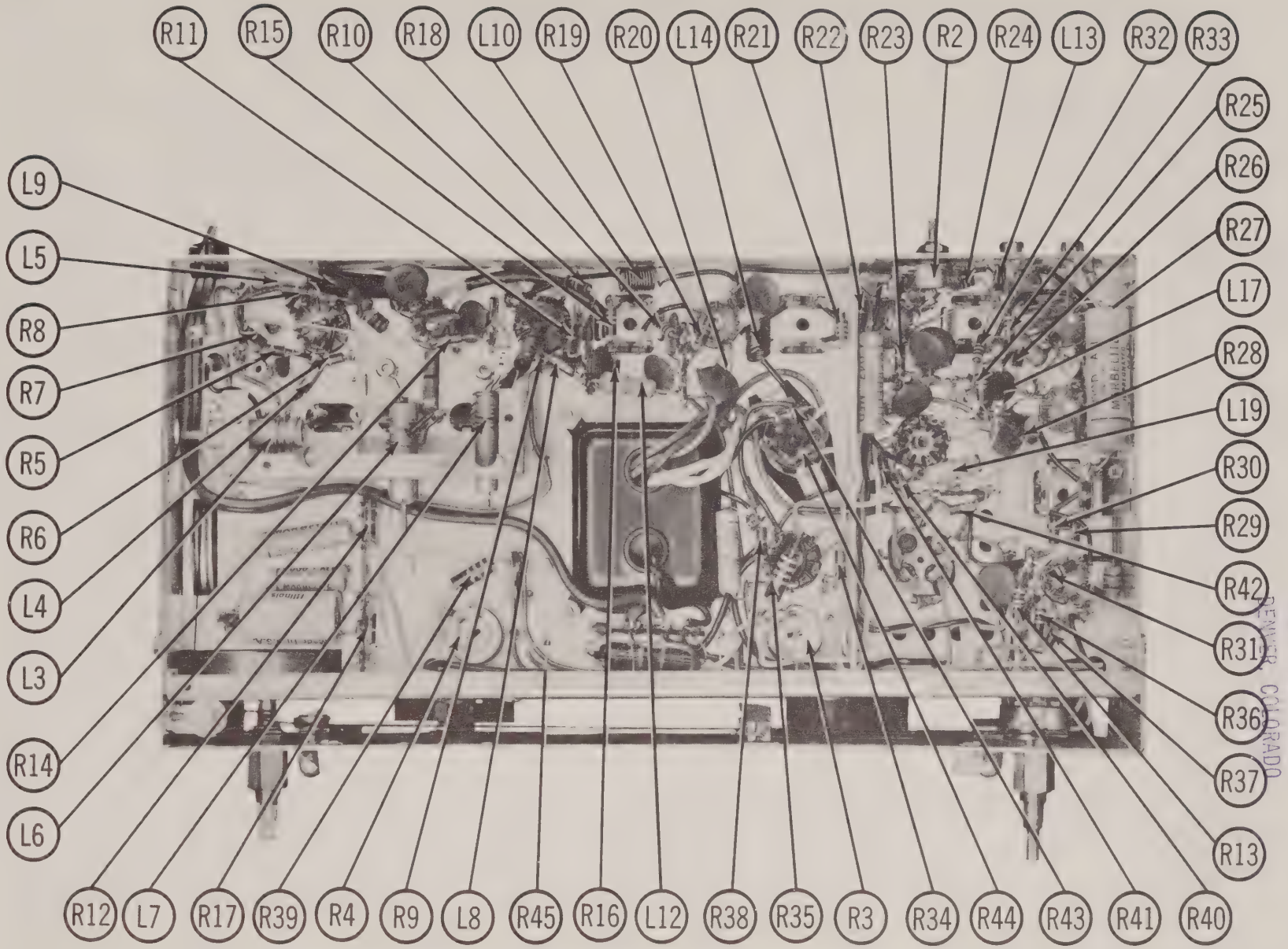
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION


FM RF AMP V1 A 6BQ7A
FM RF AMP V1 B 6BQ7A
MIXER V3 6CB6
1ST IF AMP V4 6BH6
2ND IF AMP V5 6BH6
1ST LIMITER V6 6AU6
2ND LIMITER V7 6AU6
DISCRIMINATOR V8 6AL5
FM AFC V2 A 6BQ7A
FM OSC V2 B 6BQ7A
AFC CONTROL
TO ANT 300Ω
TO ANT 72Ω
RECT V11 6X4
BIAS RECT V10 B 12AU7
SENSITIVITY CONTROL
METER AMP V9 A12AU7
METER AMP V9 B 12AU7
SIGNAL METER CONTROL
TUNING METER CONTROL
CATHODE FOLLOWER V10 A12AU7
OUTPUT LEVEL CONTROL
OUTPUTS
ON-OFF SW PART OF R1B
185VAC
190V
FM IF = 10.7 MC
THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
RESISTANCE READINGS
1 DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt
2 Socket connections are shown as bottom views
3 Measured values are from socket pin to common negative
4 Line voltage maintained at 117 volts for voltage readings
5 Minimal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings
6 All controls at minimum proper output load connected
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W Sams & Co., Inc 1955
277-5



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 TENNESSEE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Sensitivity control to maximum. (Clockwise).
AFC control to minimum. (Counter clockwise).

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield on 6CB6.(V2). Low side to chassis.	10. 7MC (Unmod)	FM	Point of non-interference.	DC probe to pin 7 (grid) of 12AU7 (V9). Common to chassis.	A1, A2, A3, A4, A5, A6	Adjust for maximum deflection.
2.	"	"	"	"	"	DC probe thru 1Meg to pin 1 (grid) of 6AU6 (V7). Common to chassis.	A7	"
3.	"	"	"	"	"	DC probe to point A . Common to chassis.	A8, A9	Slightly detune A9. Adjust A8 for maximum deflection.
4.	"	"	"	"	"	"	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield of 6CB6 (V2). Low side to chassis.	10. 7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. to pin 7 (grid) of 12AU7 (V9). Low side to chassis.	A1, A2, A3, A4, A5, A6	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	"	"	"	"	Vert. amp. thru 1Meg to pin 1 (grid) of 6AU6 (V7) Low side to chassis.	A7	"
3.	"	"	"	"	"	Vert. amp. to point A . Low side to chassis.	A8, A9	Adjust A9 so that 10. 7MC occurs at center of crossover lines similar to Fig. 2. Adjust A8 for maximum amplitude and straightness of crossover lines. Continue with step 5.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	Two 120Ω carbon resistors	High side to antenna (300Ω connection). Low side to chassis.	106MC	FM	106MC	DC probe to pin 7 (grid) of 12AU7 (V9). Common to chassis.	A10	Adjust for maximum deflection.
6.	"	"	90MC	"	90MC	"	A11	Adjust for maximum deflection. Repeat steps 5 & 6.
7.	"	"	106MC	"	106MC	"	A12, A13	Adjust for maximum deflection.
8.	"	"	90MC	"	90MC	"	A14, A15	"

METER ADJUSTMENTS

Allow a 15 minute warm-up period.
Signal meter pointer should be at zero with sensitivity control near minimum. (Not absolute minimum).
Tuning metal pointer should be at center of horizontal bar. If adjustment is necessary, both meters have labeled adjustments near rear of meter.

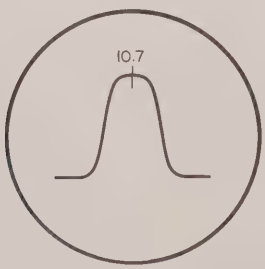


FIG. 1

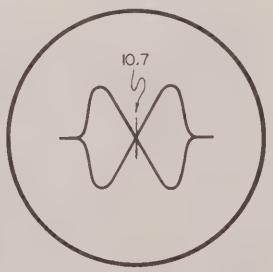


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FISHER PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BQ7A	6BQ7A	9AJ	
V2	Osc. -AFC	6BQ7A	6BQ7A	9AJ	
V3	Mixer	6CB6	6CB6	7CM	
V4	1st IF Amp.	6BH6	6BH6	7CM	
V5	2nd IF Amp.	6BH6	6BH6	7CM	
V6	1st Limiter	6AU6	6AU6	7BK	
V7	2nd Limiter	6AU6	6AU6	7BJ	
V8	Discriminator	6AL5	6AL5	6BT	
V9	Meter Amp.	12AU7	12AU7	9A	
V10	Bias Rectifier - Cathode Follower	12AU7	12AU7	9A	
V11	Rectifier	6X4	6X4	5BS	

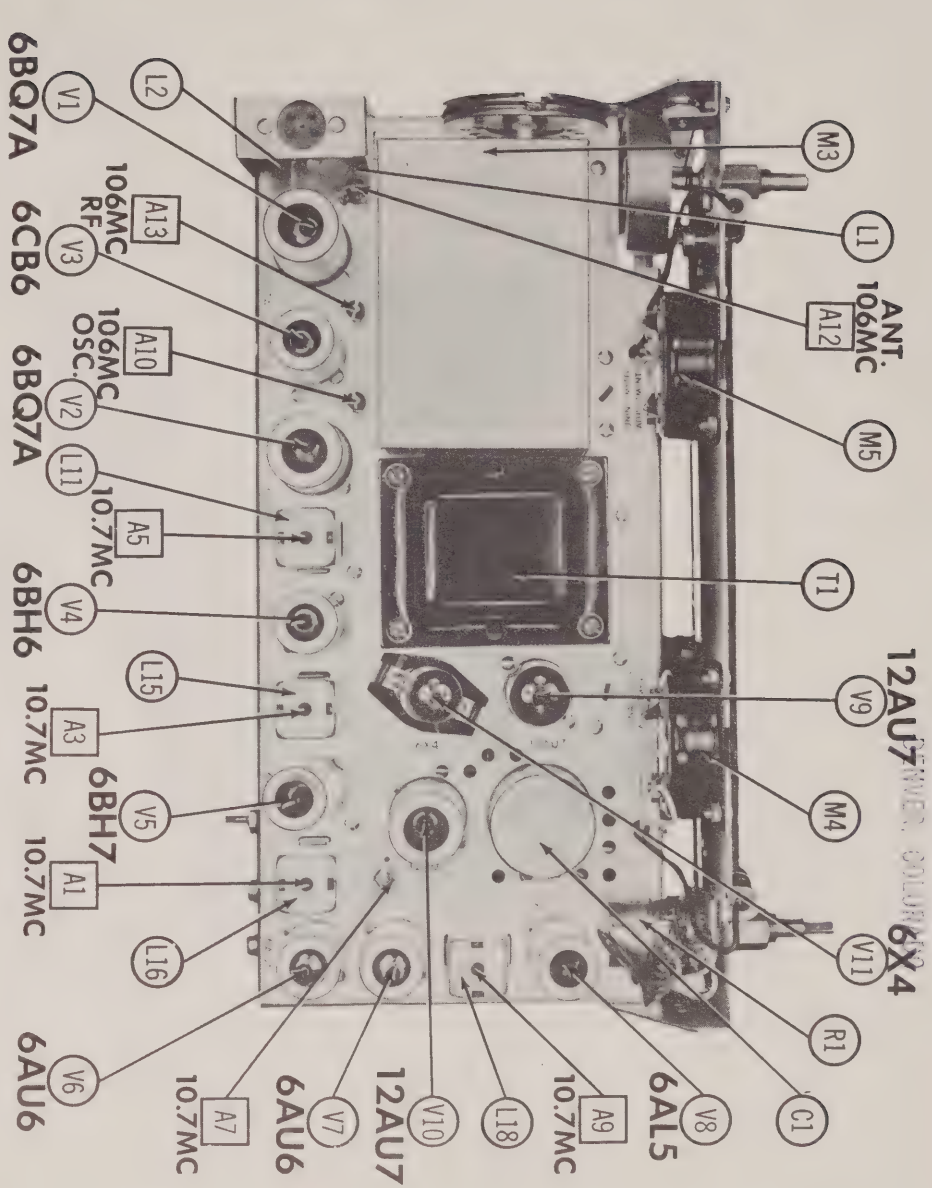
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	200	C-520-117						
B	■40	200							
C	▲40	200							
C2	50	50	C-508-115			TC39	TD-50-50	MT-0550	
C3	1.5-10		C-520-158						
C4	10		C-1317	TCZ-10	NP0K-100	ZT-541		KR-1410	
C5	470		C-520-143	DD-471	831-471	UC-5347		K-1347	
C6	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C7	500		C-1315	D6-501	GP2K-501	UC-535		K-1350	
C8	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C9	500		C-1315	D6-501	GP2K-501	UC-535		K-1350	
C10	500		C-1315	D6-501	GP2K-501	UC-535		K-1350	
C11	47		C-3350	TCZ-47	NP0K-470	ZT-5447		KR-1447	
C12	1-6		C-520-159						
C13	7								
C14	5		C-520-181						
C15	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C16	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C17	.047	200	C-68P473M2	DF-503		PT4147	IMP2-S47	3302147	
C18	5000		C-1246	DD-502	811-005	DC-525		C-1250	
C19	5000		C-3338	DD-502	811-005	DC-525		C-1250	
C20	33		C-3337	D6-330	GP1K-330	UC-5433		K-1433	
C21	1.5-10		C-520-158						
C22	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C23	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C24	5000		C-1246	DD-502	811-005	DC-525		C-1250	
C25	.022	200	C-68P223M2	DF-203	817-02	PT4122	IMP4-S22	3304122	
C26	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C27	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C28	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C29	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C30	5000		C-1246	DD-502	811-005	DC-525		C-1250	
C31	47		C-3350	TCZ-47	NP0K-470	ZT-5447		KR-1447	
C32	47		C-3350	TCZ-47	NP0K-470	ZT-5447		KR-1447	
C33	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C34	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C35	5000		C-2146	DD-502	811-005	DC-525		C-1250	Note 1
C36	220		C-3306	D6-221	GP2K-221	UC-5322		K-1322	
C37	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C38	100		C-3339	D6-101	GP1K-101	UC-531		K-1310	
C39	720		C-3422						
C40	5000		C-2146	DD-502	811-005	DC-525		C-1250	
C41	.01	200	C-68P103M2	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C42	.047	200	C-68P473M2	DF-503		PT4147	IMP2-S47	3302147	
C43	.22	200	C-68P244V2			PT4022	IMP2-P22	3302022	
C44	.01	600	C-2747	D6-103	GP2-333-103	PT611	IMP6-S1	330611	

Note 1. Not used in some versions.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FISHER PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	100KΩ	½	R50000-7					Sensitivity
B	2Meg	½						AFC & Switch
R2A	500KΩ	½	R520-139	Q11-133	A47-500K-S	AB-59	U-50	Output Level
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3	1500Ω	1	R520-149		39-1500			Signal Meter Adjustment (Wire wound)
R4	1500Ω	1	R520-149		39-1500			Tuning Meter Adjustment (Wire wound)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FISHER PART No.	IRC PART No.	
R5	1Meg	½	RC20BF105K	BTS-1Meg	
R6	470KΩ	½	RC20BF474K	BTS-470K	
R7	470Ω	½		BTS-470	
R8	1Meg	½	RC20BF105K	BTS-1Meg	
R9	4700Ω	½	RC20BF472K	BTS-4700	
R10	100Ω	½	RC20BF101K	BTS-100	
R11	1000Ω	½	RC20BF102K	BTS-1000	
R12	1Meg	½	RC20BF105K	BTS-1Meg	
R13	470KΩ	½	RC20BF474K	BTS-470K	
R14	1Meg	½	RC20BF105K	BTS-1Meg	
R15	68KΩ	½	RC20BF683K	BTS-68K	
R16	1000Ω	½	RC20BF102K	BTS-1000	
R17	1Meg	½	RC20BF105K	BTS-1Meg	
R18	470KΩ	½	RC20BF474K	BTS-470K	
R19	100Ω	½	RC20BF101K	BTS-100	
R20	1000Ω	½	RC20BF102K	BTS-1000	
R21	68KΩ	½	RC20BF683K	BTS-68K	
R22	100Ω	½	RC20BF101K	BTS-100	
R23	1000Ω	½	RC20BF102K	BTS-1000	
R24	47KΩ	½	RC20BF473K	BTS-47K	
R25	33KΩ	½	RC20BF333K	BTS-33K	
R26	15KΩ	½	RC20BF153K	BTS-15K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FISHER PART No.	IRC PART No.	
R27	10KΩ	½	RC20BF103K	BTS-10K	
R28	22KΩ	½	RC20BF223K	BTS-22K	
R29	100KΩ	½	RC20BF104K	BTS-100K	
R30	100KΩ	½	RC20BF104K	BTS-100K	
R31	150KΩ	½	RC20BF154K	BTS-150K	
R32	470KΩ	½	RC20BF474K	BTS-470K	
R33	470KΩ	½	RC20BF474K	BTS-470K	
R34	1000Ω	½	RC20BF102K	BTS-1000	
R35	33KΩ	1	RC30BF333K	BTA-33K	
R36	3.3Meg	½	RC20BF335K	BTS-3.3Meg	
R37	1Meg	½	RC20BF105K	BTS-1Meg	
R38	1000Ω	½	RC20BF102K	BTS-1000	
R39	33KΩ	1	RC30BF333K	BTA-33K	
R40	1Meg	½	RC20BF105K	BTS-1Meg	
R41	2200Ω	½	RC20BF222K	BTS-2200	
R42	47KΩ	½	RC20BF473K	BTS-47K	
R43	22KΩ	½	RC20BF223K	BTS-22K	
R44	100KΩ	½	RC20BF104K	BTS-100K	
R45A	220Ω				
B	330Ω	20	R-520-179		
C	330Ω				

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	FISHER PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .43A	382VCT .072ADC	6.3VCT @ 3.9A		520-112					

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FISHER PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Matching Trans.	.6Ω	.6Ω	L-509-139				
L2	Ant. Matching Trans.	.6Ω	.6Ω	L-509-139				
L3	FM Ant. Coil	0Ω		AS-520-177				Tapped
L4	RF Choke	.1Ω		L-520-178	19-1002		4606	2 Microhenries
L5	RF Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries; IRC part no. CLA
L6	RF Coil	0Ω		AS-520-176				Tapped
L7	Osc. Coil	0Ω	0Ω	AS-520-174				
L8	RF Choke	.4Ω		L-509-147				
L9	Fil. Choke	.2Ω	.2Ω	L-509-140				
L10	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries
L11	1st FM IF	.6Ω	.6Ω	ZZ-2987	16-3487	FM-254	1463	
L12	RF Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries; IRC part no. CLA
L13	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries
L14	Fil. Choke	0Ω		L-520-156	19-1000		4602	1.2 Microhenries
L15	2nd FM IF	.6Ω	.6Ω	ZZ-2987	16-3487	FM-254	1463	

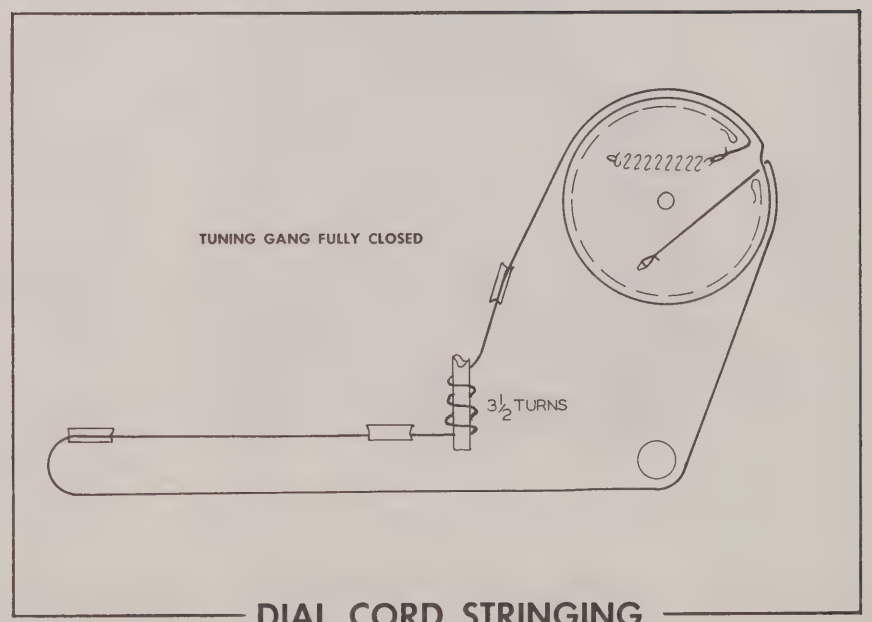
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FISHER PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L16	3rd FM IF	1.7Ω	.5Ω	ZZ-509-130	16-3487	FM-254	1463	
L17	FM Limiter	.2Ω		L-520-145				
L18	Discriminator	.7Ω	1ΩCT	ZZ-509-131	17-3497	FM-253	1464	
L19	RF Choke	1.8Ω		L-3352	19-1002		4606	2.2 Microhenries; IRC part no. CLA

MISCELLANEOUS

ITEM No.	PART NAME	FISHER PART No.	NOTES
M1	Dial Light	I-2148	#47, Bayonet
M2	Dial Light	I-2148	#47, Bayonet
M3	Tuning Cap.	C-520-118	3 Gang (Capacity values unobtainable)
M4	Meter	M-520-130-1	Signal
M5	Meter	M-520-130-2	Tuning



DIAL CORD STRINGING

PRO
L. F. BL .SHIP
3924 MEADE ST.
DENVER, COLORADO

GROMMES
MODEL LJ-3

TRADE NAME	Grommes Model LJ-3
MANUFACTURER	Precision Electronics, 9101 King Ave., Franklin Park, Illinois
TYPE SET	AC Operated 4 Channel Audio Amplifier
TUBES (Five)	Types 12AX7 Phono Preamp., 12AX7 AF Amp.-Phase Inverter (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .63 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

GROMMES MODEL LJ-3

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: GROMMES PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Preamp.	12AX7	12AX7	9A	
V2	AF Amplifier - Phase Inverter	12AX7	12AX7	9A	
V3	Audio Output	6V6GT	6V6GT	7S	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: GROMMES PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	400				FP429	TM-4022	Q-380	
B	■30	350							
C	▲10	300							
D	20	25							
C2A	■10	250					TM-15-250	S-035	
B	100	15					TD-100-15	FM-2512	
C	▲10	250							Note 1
C3	1000			DD-102	801-001	DC-525	IMP6-D1	K-1210	
C4	2000			DD-202	801-002	DC-522	IMP6-D2	C-1220	
C5	3000			DD-302	811-003	UC-523	IMP6-D3	C-1230	
C6	5000			DD-502	811-005	DC-525	IMP6-D5	C-1250	
C7	.05	400		DF-503		PT415	IMP4-S5	330415	
C8	.05	400		DF-503		PT415	IMP4-S5	330415	
C9	5000			DD-502	811-005	DC-525	IMP6-D5	C-1250	
C10	5000			DD-502	811-005	DC-525	IMP6-D5	C-1250	
C11	.01	400		D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C12	.01	400		D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C13	470	500		D6-471	GP2K-471	UC-5347		K-1347	

Note 1. C2C section is not used.

CONTROLS

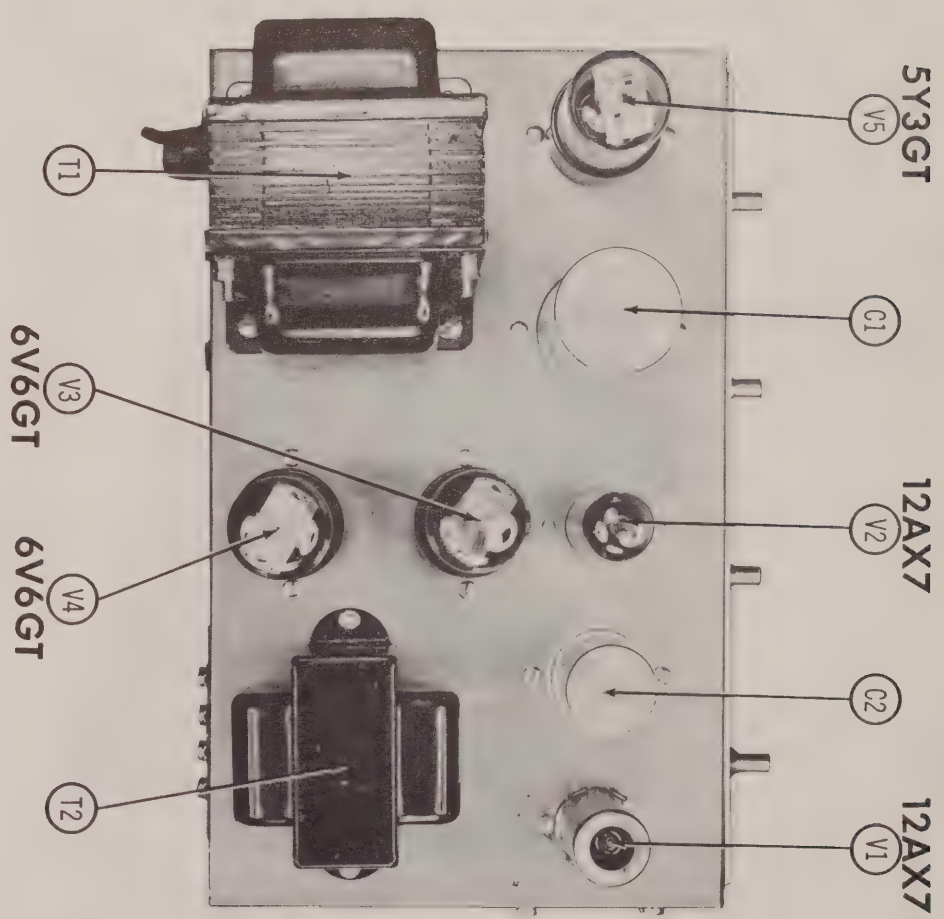
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: GROMMES PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1.5Meg	½	W4508		AT-125	ABT-74		Volume-tapped Ⓐ 500KΩ
B	Shaft		Not Req.		RS-2	AK-9		Attach to R1A
C	Switch		Not Req.		SWE-12	KB-1		Attach to R1A
R2A	2Meg	½	W3851	Q11-139	A47-2Meg-S	ABT-82	UT-451	Bass-tapped Ⓐ 800KΩ
B	Shaft		Not Req.	Not Req.	RS-2	AK-9	Not Req.	Attach to R2A
R3A	1.5Meg	½	W3181	Q13-139	A47-2Meg-Z	B-76	U-55	Treble
B	Shaft		Not Req.	Not Req.	RS-2	Not Req.	Not Req.	Attach to R3A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: GROMMES PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R4	22KΩ	½		BTS-22K	
R5	22KΩ	½		BTS-22K	
R6	2200Ω	½		BTS-2200	
R7	100KΩ	1		BTA-100K	
R8	100KΩ	½		BTS-100K	
R9	820KΩ	½		BTS-820K	
R10	1Meg	½		BTS-1Meg	
R11	3.3Meg	½		BTS-3.3Meg	
R12	100KΩ	1		BTA-100K	
R13	47KΩ	½		BTS-47K	
R14	100Ω	½		BTS-100	
R15	470KΩ	½		BTS-470K	
R16	100KΩ	½		BTS-100K	
R17	470KΩ	½		BTS-470K	
R18	390KΩ	½		BTS-390K	
R19	300Ω	10		1 3/4A-300	
R20	470KΩ	½		BTS-470K	
R21	2200Ω	½		BTS-2200	
R22	5600Ω	2		BTB-5600	
R23	2700Ω	½		BTS-2700	
R24	47KΩ	½		BTS-4700	Note 1

Note 1. Some versions use a 27KΩ resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	GROMMES PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @.63A	684VCT .083ADC	5VAC @2A	6.3VCT @1.48A		PC-8409 ①	P-2952 ①	R-11A ①	P9310	24R04U ①

① Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	GROMMES PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	8.4Ω CT	16Ω tap @ 8Ω, 4Ω		A-3027			Z1404 ①	26S59	① Drill one new mounting hole.

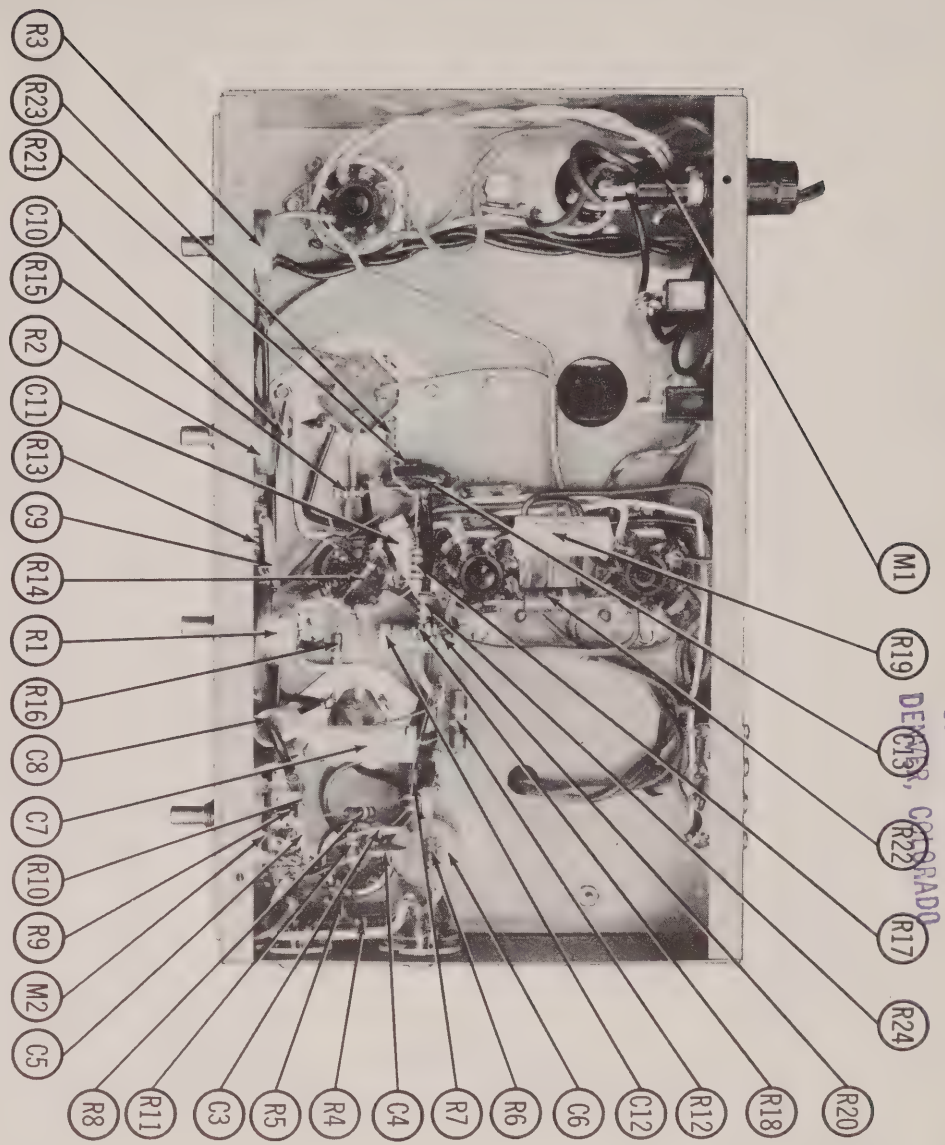
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			GROMMES PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1A 250V			312001 (3AG-1A)	342001	AGC 1	HKP

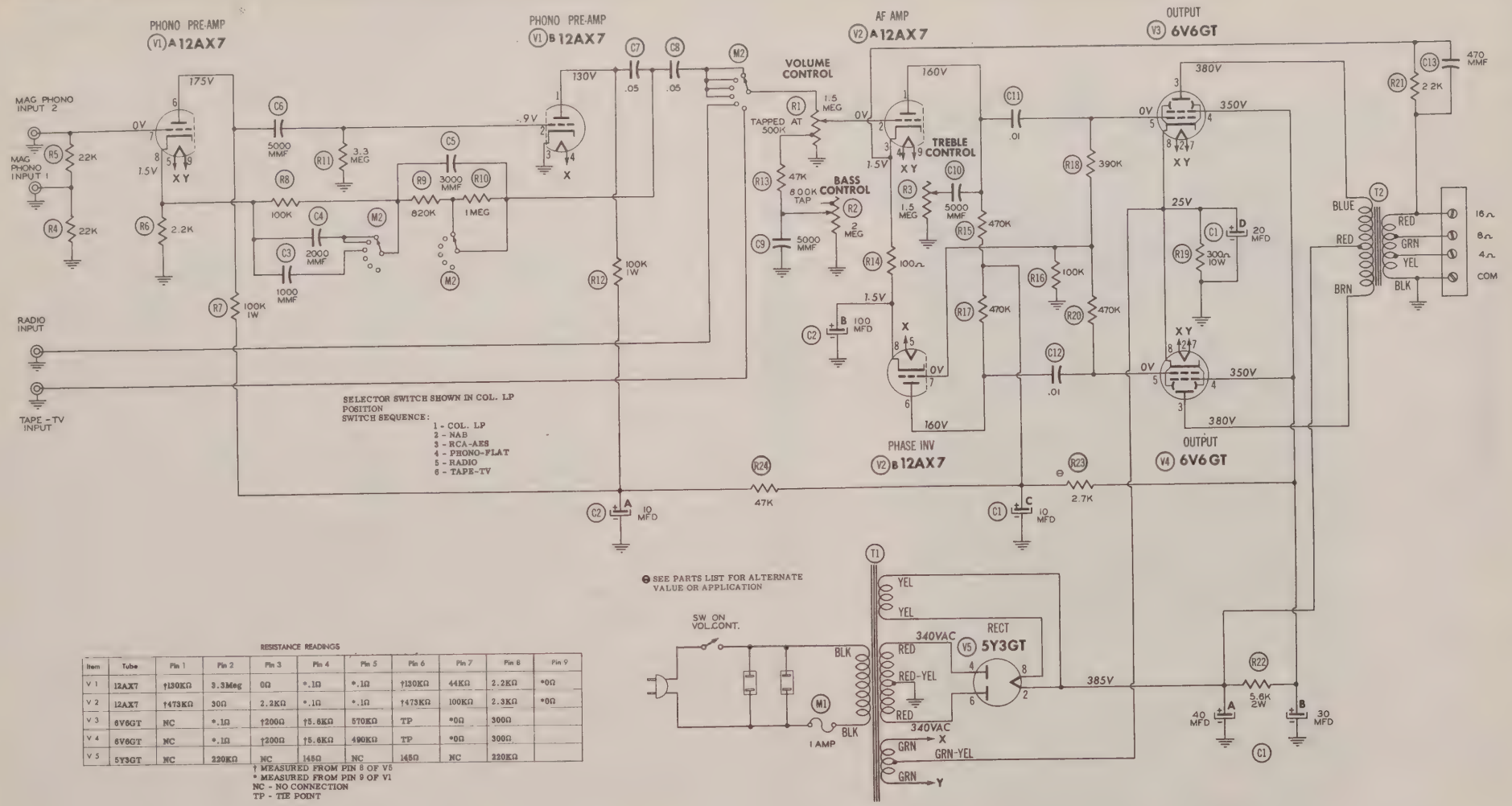
MISCELLANEOUS

ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2	Switch		Selector and record compensation

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†130KΩ	3.3Meg	0Ω	*.1Ω	*.1Ω	†130KΩ	44KΩ	2.2KΩ	*0Ω
V 2	12AX7	†473KΩ	30Ω	2.2KΩ	*.1Ω	*.1Ω	†473KΩ	100KΩ	2.3KΩ	*0Ω
V 3	6V6GT	NC	*.1Ω	†200Ω	†5.6KΩ	570KΩ	TP	*0Ω	300Ω	
V 4	6V6GT	NC	*.1Ω	†200Ω	†5.6KΩ	490KΩ	TP	*0Ω	300Ω	
V 5	5Y3GT	NC	220KΩ	NC	145Ω	NC	145Ω	NC	220KΩ	

† MEASURED FROM PIN 8 OF V6
* MEASURED FROM PIN 9 OF V1
NC - NO CONNECTION
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

PHOTOFACT* Folder

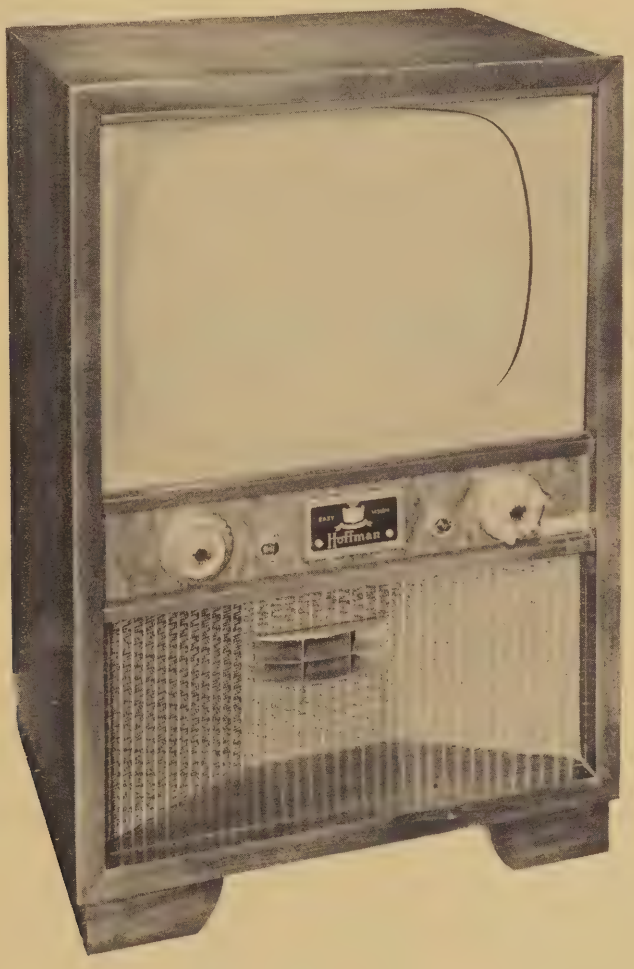
*TRADE MARK

RETMA MEMBER

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 21M351N

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-24B)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

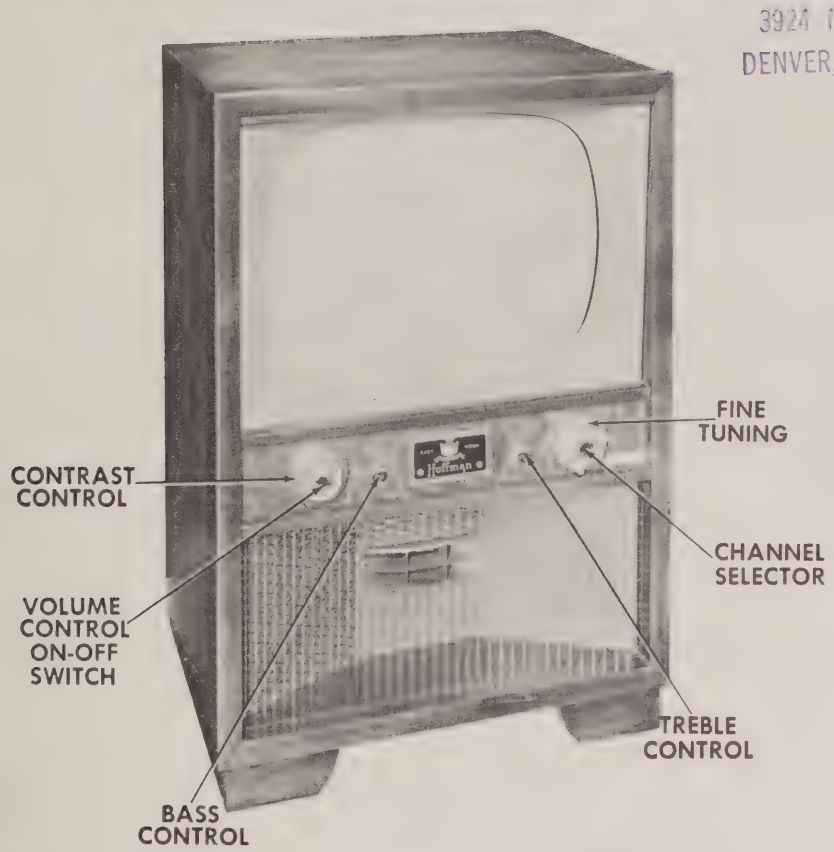
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 5-55 SET 277 FOLDER 7

PHOTOFACT* Folder
*TRADE MARK

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-24B)



HOFFMAN MODEL 21M351N

TRADE NAME	Hoffman	MODELS	CHASSIS
		21B352, U, 21B729, U, 21M351, U, 21M728, U, 21P353, U, 21P730, U, 21P731, U	408-21
		21U208, U	408-21B
		21B352L, LU, 21M351L, LU, 21M728L, LU, 21P353L, LU, 21P731L, LU	408-21L
		21B352N, NU, 21M351N, NU, 21M728N, NU, 21P353N, NU, 21P731N, NU, 21U208N, NU	408-21N
		24B732, U, 24M354, U, 24P356, U, 24P733, U	410-24
		24U211, U	410-24B
MANUFACTURER	Hoffman Radio Corp., 6200 S. Avalon Blvd., Los Angeles 3, Calif.		
TYPE SET	Television Receiver		
TUBES	Twenty-two		
POWER SUPPLY	110-120 Volts AC - 60 Cycle	RATING 1.9 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

INDEX

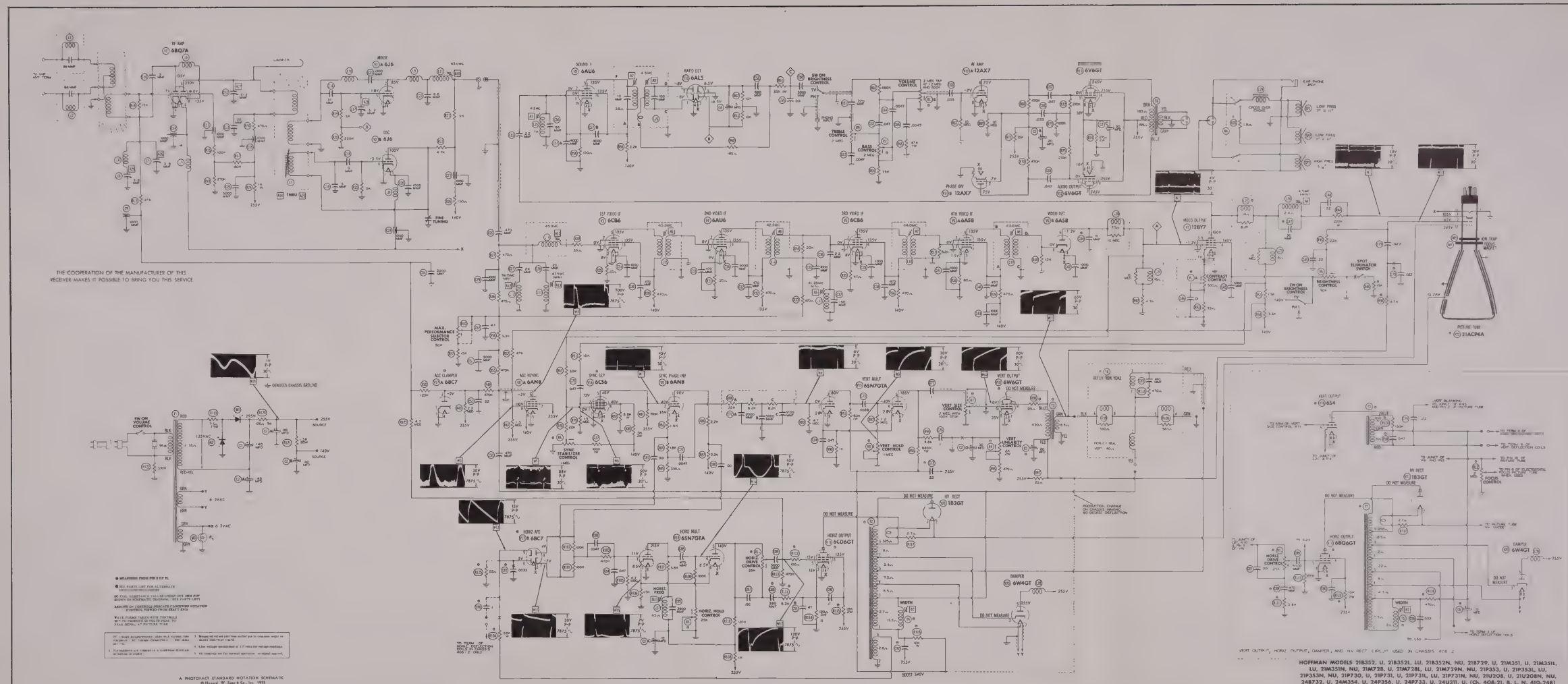
Alignment Instructions 6, 7
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 15 thru 18
Photographs
- Cabinet-Rear View 11
- Capacitor Identification 4, 9
- Chassis-Top View 3
- RF Tuner 10
- Resistor Identification 14, 19

Photographs (Cont)
- Trans., Inductor & Alignment Identification 20

Resistance Measurements 8
Servicing in the Field 22
Schematic (Alternate Tuner) 13
Schematic (TV) 2
Trouble Shooting Aids 12, 21
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-248)

PROPERTY OF
L. F. BLA
3924 ME
DENVER, CO

CHASSIS TOP VIEW

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-248)

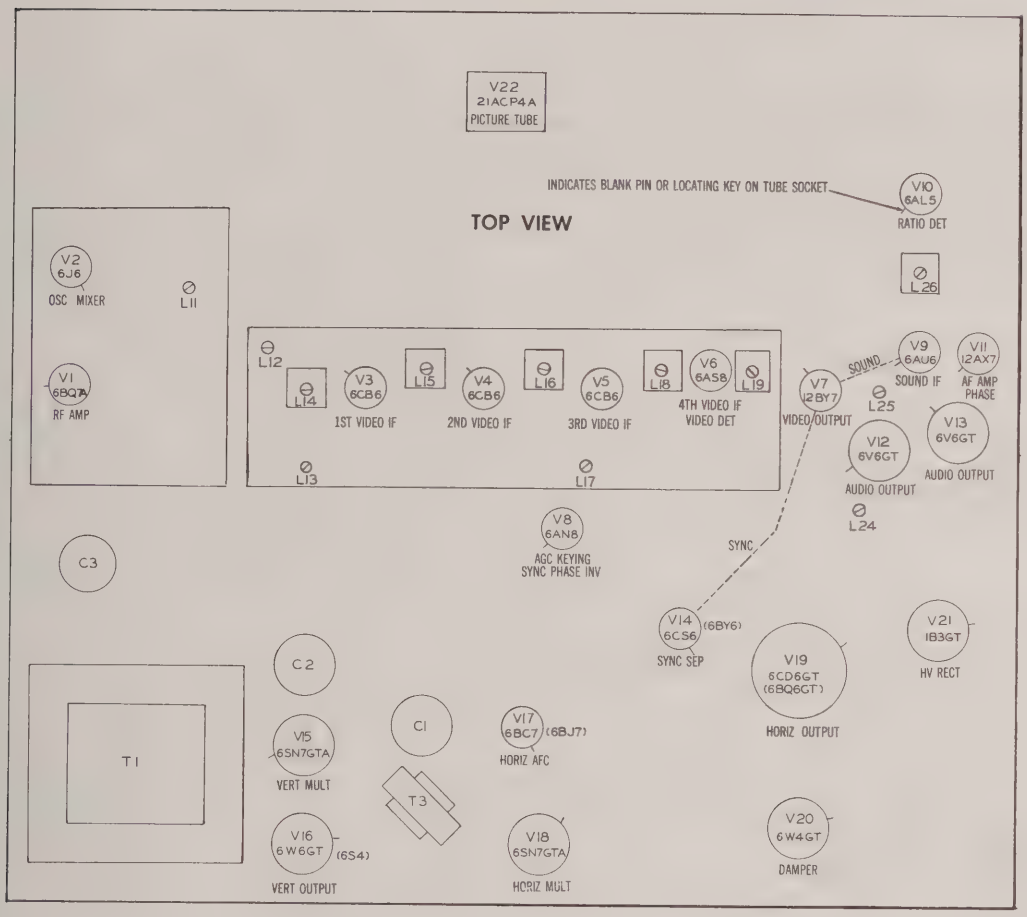
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HOFFMAN MODELS 218352, U, 218352L, LU, 218352N, NU, 218750, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U508, U, 21U508N, NU, 248P332, U, 248P334, U, 24AP396, U, 24AP733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-248)

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V7**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V8, V22**
Has pic, no sound - **V9, V10, V11, V12, V13**
Overloaded picture - **V8, V17**

SYNC FAILURE
No vert. sync - **V8, V15**
No horiz. sync - **V8, V17, V18**
No vert. or horiz. sync - **V8, V14**

SWEEP FAILURE
No raster, has sound - **V18, V19, V20, V21, V22**
No vertical deflection - **V15, V16**
Poor vert. linearity or foldover - **V15, V16**
Poor horiz. linearity or foldover - **V18, V19, V20**
Narrow picture - **V18, V19, V20, V21, M1, M2**
Vert. off freq. - **V8, V15**
Horiz. off freq. - **V8, V17, V18**

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-24B)

PROPERTY OF
L. F. BLANKENSHIP
3924 M[illegible] ST.
DENVER [illegible]

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Do not remove V18 to eliminate the high voltage shock hazard.
Switch the tuner between channels so that the detent roller cuts one of the high points of the drum disc. This will disable the local oscillator and reduce the possibility of erroneous indications.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.005MFD	High side to point A. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 10KΩ to point D. Common to chassis.	A1, A2	Attenuate signal level to obtain 5 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	"	DC probe to point C. Common to chassis.	A3	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct reading. Repeat steps 1 and 2 until readings do not change. Disconnect alignment equipment and tune in a TV station with good audio. If necessary SLIGHTLY retouch A3 for MINIMUM buzz and clearest sound. A3 is located on top of chassis.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.005MFD	High side to point A. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point D thru 10KΩ. Low side to chassis.	A1, A2	Disconnect stabilizing capacitor C4. Adjust A1 and A2 for curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	"	"	"	"	Vert. Amp. to point C thru 10KΩ. Low side to chassis.	A3	Reconnect stabilizing capacitor C4. Adjust so that 4.5MC occurs at crossover lines as in Fig. 2. SLIGHTLY retouch A3 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	.006MFD	High side to point A. Low side to chassis.	4.5MC (Unmod)	Any	DC probe to pin 11 of picture tube thru detector (Fig.3). Common to chassis.	A4	Adjust for MINIMUM deflection.

VIDEO IF ALIGNMENT

Turn the contrast control fully clockwise. Connect the negative lead of a 4 volt battery to the ungrounded side of C52. Positive lead to chassis. Attenuate generator output as low as possible to obtain readings.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over converter tube (V2). Low side to chassis.	41.25MC (Unmod)	Set between any two channels	DC probe to point A. Common to chassis.	A5	Adjust for MINIMUM deflection.
5.	"	"	43.0MC	"	"	A6	Attenuate output to maintain 1 volt at VTVM. Adjust for maximum deflection.
6.	"	"	44.0MC	"	"	A7	"
7.	"	"	42.5MC	"	"	A8	"
8.	"	"	45.5MC	"	"	A9	"
9.	"	"	45.0MC	"	"	A10	Adjust for MINIMUM deflection.
10.	"	"	45.0MC	"	"	A11	Adjust for maximum deflection.
11.	"	"	39.75MC	"	"	A12	Adjust for MINIMUM deflection.
12.	"	"	47.5MC	"	"	A13	"
13.	"	"	45.0MC	"	"	A10	Attenuate output to maintain 1 volt at VTVM. Readjust A10 for maximum deflection. Repeat steps 4 thru 13 until no further improvement is noted.

OVERALL VIDEO IF RESPONSE CHECK

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Direct	High side to ungrounded tube shield floating over converter tube (V2). Low side to chassis.	43.5MC (10MC Swp)	41.25MC 42.5MC 43.0MC 45.0MC 45.75MC 39.75MC 47.5MC	Set channel selector between any two channels	Vert. Amp. thru 10KΩ to point A. Low side to chassis.		Check for response curve similar to Fig.4. Use high gain scope and sweep generator output and remove bias battery to view trap markers. If necessary retouch A8, A8 and A11 to obtain desired response. Bandpass should be approximately 3.75MC. Adjust A9 to place 45.75MC at 50% response point. Adjust A6 to place 42.0MC marker. Adjust A7 to eliminate fill on response curve.

FIG. 1

FIG. 2

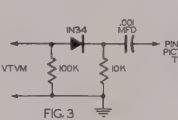


FIG. 3

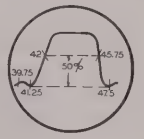


FIG. 4

FIG. 5

FIG. 6

OSCILLATOR ALIGNMENT

Restore converter tube (V2) shield to its original position.
The channel oscillator adjustment screws are reached thru a hole just to the right of the channel selector switch shaft.
Leave bias connected as under Video IF Alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A14	Adjust to place sound marker in trap notch as shown in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A15	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A16	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A17	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A18	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A19	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A20	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A21	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A22	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A23	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A24	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A25	

RF AND MIXER ALIGNMENT

Leave bias connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
16.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	13	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A26, A27, A28	Adjust for response curve similar to Fig.6 with markers above 90%.
17.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any one channel make compromise adjustments of A26, A27 and A28 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	11			
			201MC (10MC Swp)	199.25MC 203.75MC	10			
			195MC (10MC Swp)	193.25MC 197.75MC	9			
			189MC (10MC Swp)	187.25MC 191.75MC	8			
			183MC (10MC Swp)	181.25MC 185.75MC	7			
			177MC (10MC Swp)	175.25MC 179.75MC	6			
			85MC (10MC Swp)	83.25MC 87.75MC	5			
			79MC (10MC Swp)	77.25MC 81.75MC	4			
			69MC (10MC Swp)	67.25MC 71.75MC	3			
			63MC (10MC Swp)	61.25MC 65.75MC	2			
			57MC (10MC Swp)	55.25MC 59.75MC				

43.5MC TRAP ADJUSTMENT

Adjust the 43.5MC trap trimmer (A29) for MINIMUM interference on channel 2.

UHF OSCILLATOR ALIGNMENT

Switch tuner to UHF position and remove tuner knobs. The UHF oscillator adjustment screws are reached thru the same hole used for VHF oscillator adjustment. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel strip. Leave bias connected as under "VHF Oscillator Adjustment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
18.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	473MC (10MC Swp)	471.25MC 475.75MC	14	Vert. Amp. thru 10KΩ to point A. Low side to chassis.	A30	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			515MC (10MC Swp)	513.25MC 517.75MC	21		A31	
			575MC (10MC Swp)	573.25MC 577.75MC	31		A32	
			635MC (10MC Swp)	633.25MC 637.75MC	41		A33	
			695MC (10MC Swp)	693.25MC 697.75MC	51		A34	
			755MC (10MC Swp)	753.25MC 757.75MC	61		A35	
			815MC (10MC Swp)	813.25MC 817.75MC	71		A36	
			875MC (10MC Swp)	873.25MC 877.75MC	81		A37	

UHF RF AND MIXER ALIGNMENT

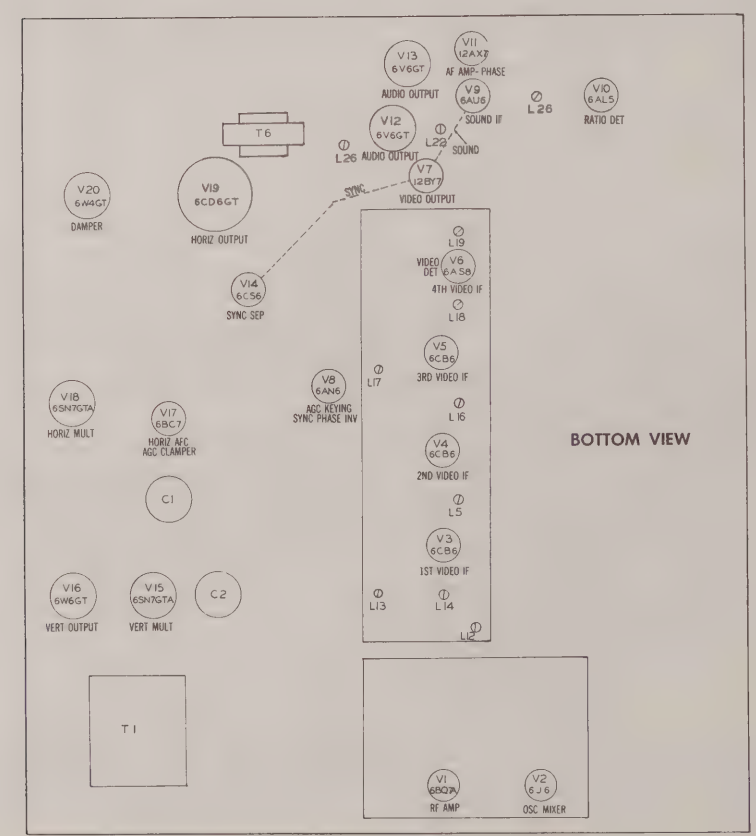
The RF and mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of the portion should not be required in the field.

HOFFMAN MODELS 21H332, U, 21H337L, LU, 21H337N, NU, 21H339, U, 21M331, U, 21M331L, LU, 21M331N, NU, 21M332, U, 21M332L, LU, 21M332N, NU, 21P335, U, 21P335L, LU, 21P335N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P732, U, 21P732L, LU, 21P732N, NU, 21P739, U, 21M331, U, 21M331L, LU, 21M331N, NU, 21P734, U, 21P734L, LU, 21P734N, NU, 21P735, U, 21P735L, LU, 21P735N, NU, 21P737, U, 21P737L, LU, 21P738, U, 21P738L, LU, 21P738

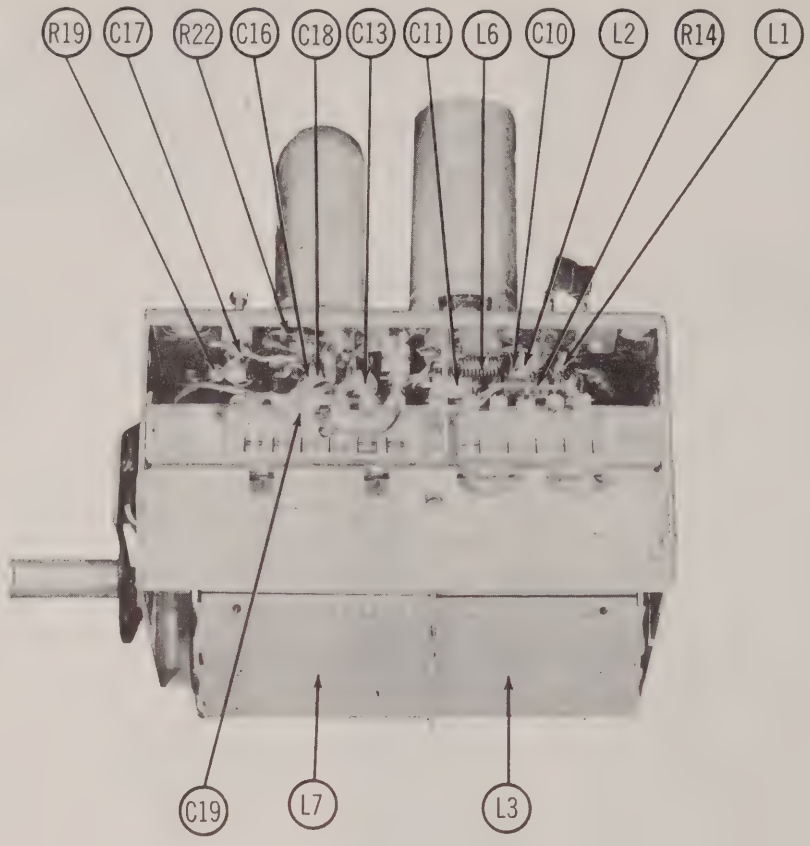
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	850KΩ	0Ω	.1Ω	0Ω	†1.6KΩ	†230KΩ	INF	0Ω
V 2	6J6	†6.5KΩ	†16.8KΩ	.1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 3	6CB6	70KΩ	47Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	0Ω		
V 4	6AU6	.1Ω	0Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	120Ω		
V 5	6CB6	70KΩ	47Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	0Ω		
V 6	6AS8	†2.1KΩ	.1Ω	180Ω	.1Ω	0Ω	4.7KΩ	0Ω	.1Ω	†2.1KΩ
V 7	12BY7	190Ω	4.7KΩ	0Ω	0Ω	0Ω	.1Ω	†6.5KΩ	†1.6KΩ	0Ω
V 8	6AN8	†6KΩ	†390KΩ	4KΩ	.1Ω	0Ω	500KΩ	†120Ω	†55KΩ	†1.6KΩ
V 9	6AU6	1Ω	150Ω	.1Ω	0Ω	†3.8KΩ	†3.8KΩ	150Ω		
V 10	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 11	12AX7	†550KΩ	10Meg	0Ω	.1Ω	.1Ω	†550KΩ	10Meg	0Ω	0Ω
V 12	6V6GT	TP	0Ω	†315Ω	†120Ω	370KΩ	TP	.1Ω	270Ω	
V 13	6V6GT	NC	0Ω	†315Ω	†120Ω	370KΩ	TP	.1Ω	270Ω	
V 14	6CS6	35KΩ	0Ω	0Ω	.1Ω	†390KΩ	†13KΩ	1.5Meg		
V 15	6SN7GTA	4.7Meg	▲200KΩ	1KΩ	1.6Meg	▲700KΩ	1KΩ	.1Ω	0Ω	
V 16	6W6GT	TP	0Ω	†700Ω	†800Ω	1.4Meg	TP	.1Ω	1.3KΩ	
V 17	6BC7	0Ω	700KΩ	0Ω	0Ω	.1Ω	68KΩ	5Meg	5Meg	68KΩ
V 18	6SN7GTA	4.7Meg	†5.8KΩ	1.5KΩ	120KΩ	†120KΩ	1.5KΩ	.1Ω	0Ω	
V 19	6CD6GT	TP	0Ω	120Ω	NC	470KΩ	TP	.1Ω	†18KΩ	TOP CAP ▲9Ω
V 20	6W4GT	NC	NC	INF	NC	†120Ω	NC	INF	INF	
V 21	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲335Ω
V 22	21ACP4A	0Ω	†40KΩ	PIN 10 †250Ω	PIN 11 †290KΩ	PIN 12 .1Ω				

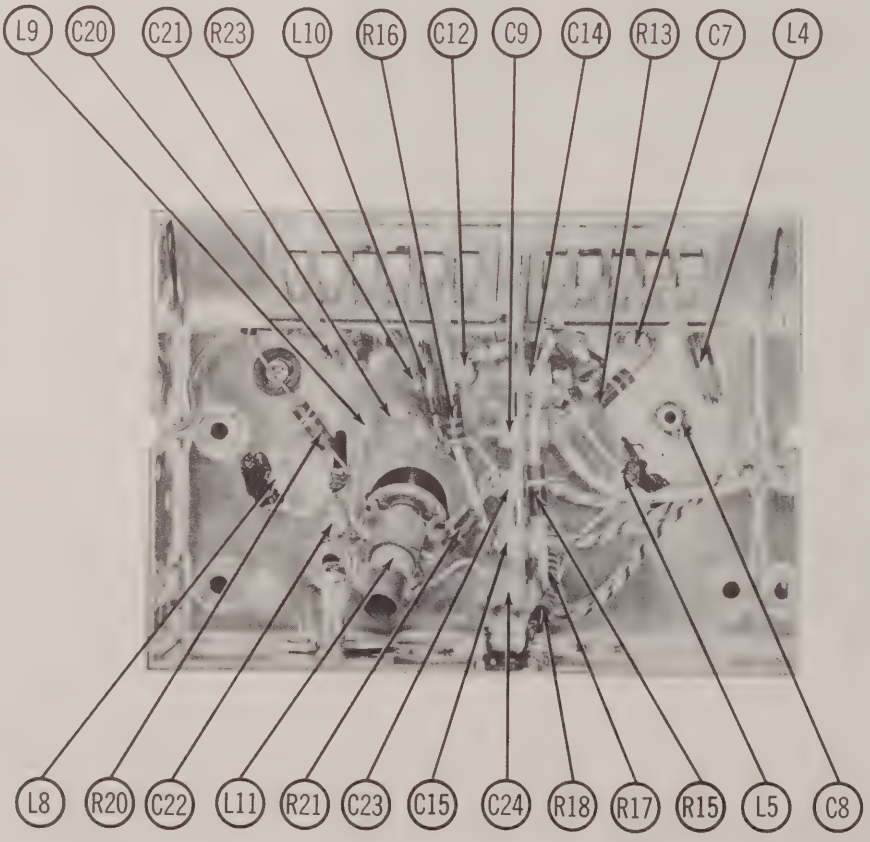
ALL READINGS MEASURED WITH TV-PHONO SWITCH IN "TV" POSITION
† MEASURED FROM OUTPUT OF M1.
▲ MEASURED FROM PIN 3 OF V20
TP - TIE POINT
NC - NO CONNECTION



TUBE PLACEMENT CHART

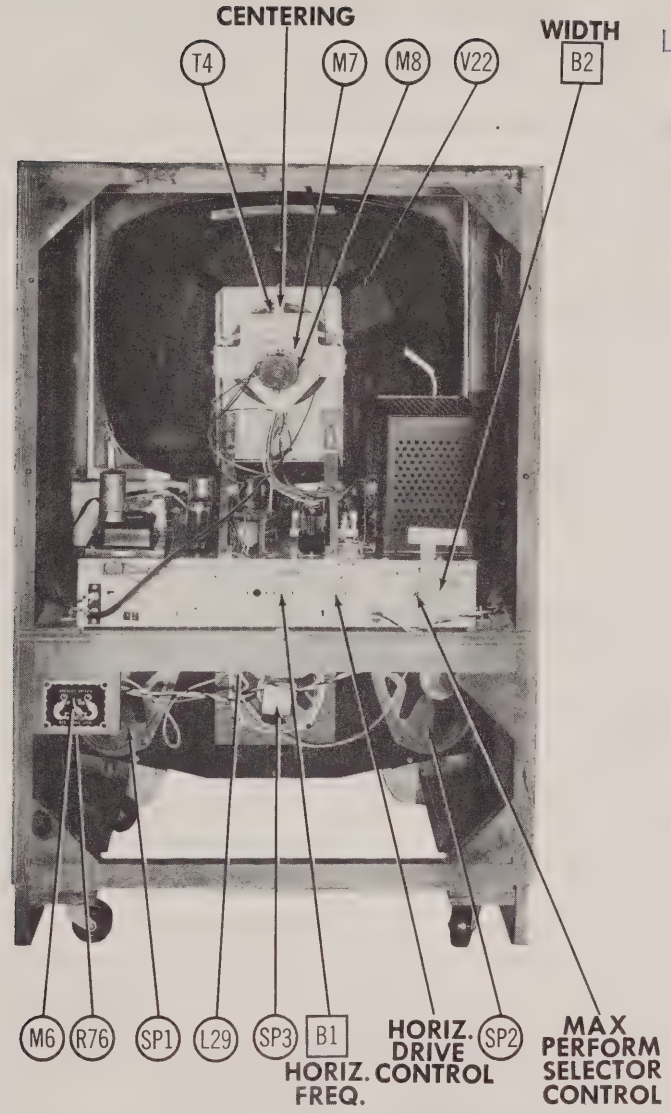


RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3524 MEADE ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal drive control as far clockwise as possible without the presence of a vertical white line or compression near the center of the picture.

Set the horizontal hold control to its mid-range position. Adjust the horizontal frequency slug (B1) counter clockwise while switching on and off channel until the picture loses sync. Turn B1 clockwise and note the least number of diagonal bars just before picture pulls into sync. There should not be less than 2 bars if horizontal circuits are operating properly. Continue turning B1 clockwise while switching on and off channel until sync is lost again, then turn B1 counter clockwise and note the point where picture pulls into sync. Turn B1 an additional one-half turn counter clockwise.

Turn the horizontal drive control counter clockwise until a white line appears near the center of the raster. Turn the horizontal drive control clockwise until white line disappears.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19 and V20. Check M1 and M2. Check T2, T4A, C89, R115, R119 and other associated components. Check adjustments B2 and R11.

DRIVE LINES

Check by substitution V19 and V20. Check adjustment R11. Check C89, R115, R119, M1, M2 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18, V19 and V20. Check C84 for open. Check L27, C85, C83, R109 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T2 and T4 for internal arcing. Check C82, C85, R104, R108, R107 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V15 and V16. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R97, R96, R95, C5 and other associated components.	Check C73, C77, R90, R91, R93, R116 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V15 and V16. Check vertical size and vertical linearity controls for proper operation. Check T3, T4B, R93 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V15 and V16. Check R116, R93, C77 and other associated components.

COMPRESSED AT TOP

Check by substitution V15 and V16. Check R95, R4, C2D, C77 and other associated components.

FOLDS

Check by substitution V15 and V16. Check R94, C76, C77, T3 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 and V8. Check C70, R81, R80, R87, R86 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V15. Check vertical integrator network. Check R8, R92, C74 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check C80, C81, C83, C85, R3, R109, L27 and other associated components.

HORIZONTAL BENDING

Check by substitution V8, V14, V17 and V18. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check L22, L23, R53, R54, C45, C48 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A4. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check L20, L22, C48, R44, R43 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check video detector network. Check C48, R44, R43 and other associated components.

SMEAR

Substitute V7. Check L20, L22, C48, R44 and other associated components. Check video IF alignment.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11, V12 and V13. Check stages V11, V12 and V13 using audio signal generator. Apply audio signal across R1B. Check speaker-phono switch for speaker position. Check TV-phono switch for TV position.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C60, C66, C69, C67, R71, R70, R68, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A3 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check M1, M2 and R119. Check B+ filter and decoupling network.

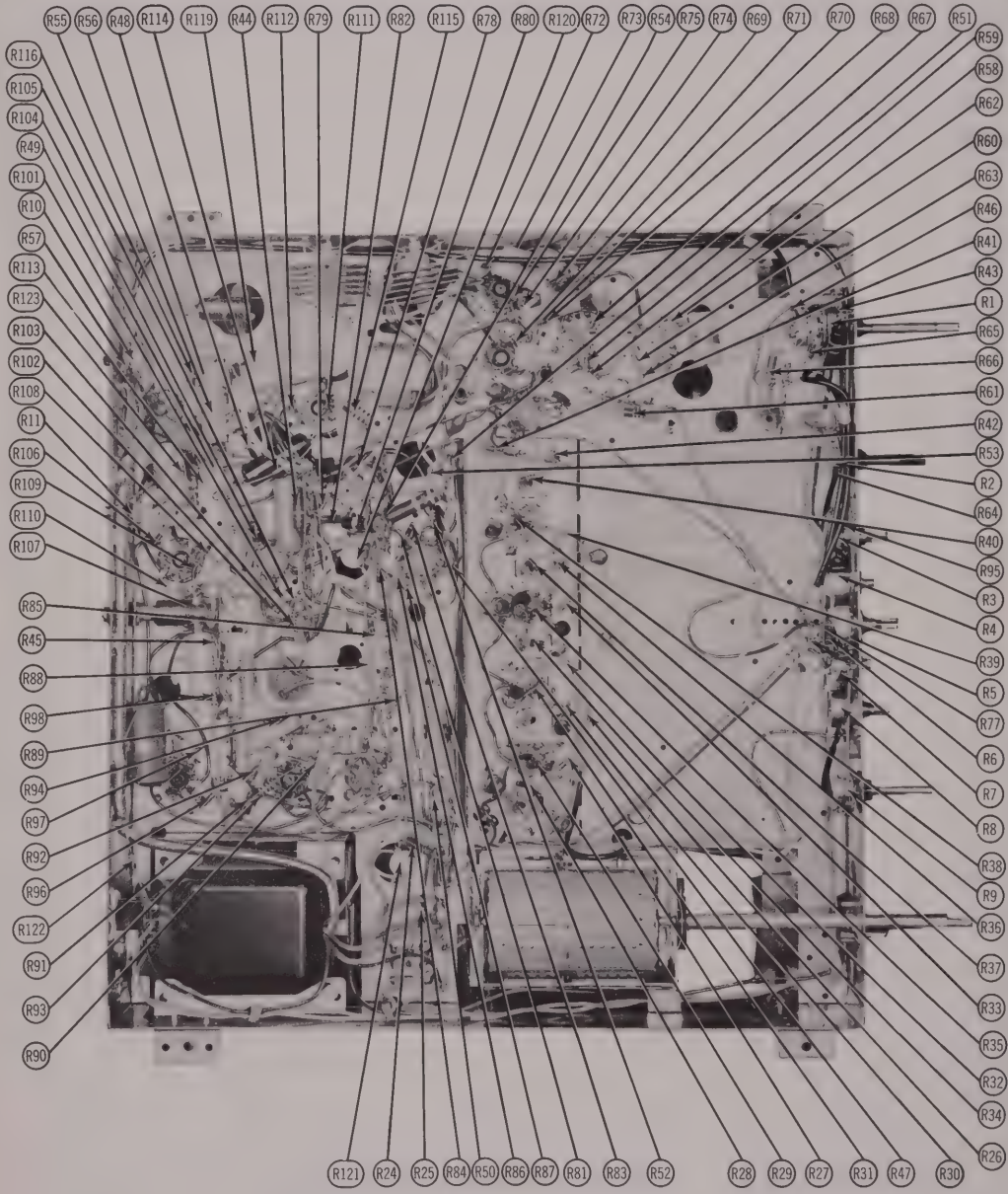
SMALL AND/OR DIM PICTURE

Check M1, M2 and R119. Check B+ filter and decoupling network.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-24B)

ALTERNATE TUNER SCHEMATIC



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

HOFFMAN MODELS 218352, V, 218352L, LV, 218352N, NV, 218729, V, 21M351, V, 21M351L, LV, 21M351N, NV, 21M728, V, 21M728L, LV, 21M728N, NV, 218753, V, 218753L, LV, 218753N, NV, 21P720, V, 21P721, V, 21P721L, LV, 21P721N, NV, 21U208, V, 21U208N, NV, 248732, V, 24M354, V, 24P256, V, 24P723, V, 24U211, V, (CH. 408-21, B, L, N, 410-248)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: HOFFMAN PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	
V2	Osc.-Mixer	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6AU6	6AU6	7BK	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.-Video Detector	6AS8	6AS8	9DS	
V7	Video Output	12BY7	12BY7		
V8	AGC Keying-Sync Phase Inv.	6AN8	6AN8	9DA	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amp.-Phase Inverter	12AX7	12AX7	9A	
V12	Audio Output	6V6GT	6V6GT	7S	
V13	Audio Output	6V6GT	6V6GT	7S	
V14	Sync Separator	6CS6	6CS6	7CH	6BY6 used as an alternate
V15	Vert. Mult.	6SN7GTA	6SN7GTA	8BD	
V16	Vert. Output	6W6GT	6W6GT	7S	6S4 used in Ch. 408-21
V17	Horiz. AFC-AGC Clamper	6BC7	6BC7	9AX	6BJ7 used as an alternate
V18	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V19	Horiz. Output	6CD6GT	6CD6GT	5BT	6BQ6GT used in Ch. 408-21
V20	Damper	6W4GT	6W4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: HOFFMAN PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V22	21ACP4A ①		21ACP4A ①	21ACP4A ①		12N	① Aluminized
	21AMP4A ①	21AMP4A ①	21AMP4A ①	21AMP4A ①	21AMP4A ①	12N	
		21AMP4				12N	
	21YP4	21YP4	21YP4	21YP4	21YP4	12L	
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ①	12L	
	24TP4 ①	24TP4 ①				12N	
	24CP4A ①	24CP4A①	24CP4A ①	24CP4A ①	24CP4A ①	12N	
				24CP4		12N	
	21AUP4A					12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: HOFFMAN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C1	■140	150				FP117	TM-140-150	T-040	
C2A	▲140	150	4270			FP420.26			
B	■40	150				TC48			
C	▲50	50							
D	30	50							
C3A	▲100	300	4275			FP389.1		Q-010	
B	■20	300							
C	▲10	300							
C4	5	50	4209			TC30	TD-5-50	MMT-0505	
C5	20	450				TC75	TD-20-450	FM-4520	Note 1, 6
C6	10	600	4253			TC92		FM-4520 *	Note 2
								FM-4520	
C7	3-8			829-10					
C8	3-8			829-10					
C9	1000								
C10	3			TCZ-3	NP0A-030	ZT-5533			
C11	1000								
C12	.5-3			829-3	3115-01-0R5	CT565A			
C13	120			D6-121	811-121	UC-5312			
C14	1000								
C15	1000								
C16	51			D6-510	GP1K-510	UC-545			
C17	.5-3			829-3	3115-01-0R5	CT565A			
C18	10			TCZ-10	NP0A-100	ZT-541			
C19	5								
C20	1000			DD-102	801-001	DC-521			
C21	1500			DD-152	801-0015	DC-5215			
C22	6.8			TCZ-6.8	NP0A-6R8	ZT-5568			
C23	1000								
C24	1000								
C25	5000		4029	DD-502	811-005	DC-525		C-1250	
C26	470		14050	D6-471	831-471	UC-5347		K-1347	
C27	24	1000							
C28	20	1000							
C29	1000		14031	DD-102	801-001	DC-521		K-1210	
C30	470		14009	D6-471	831-471	UC-5347		K-1347	
C31	1000		14031	DD-102	801-001	DC-521			
C32	470		14009	D6-471	831-471	UC-5347		K-1347	
C33	470		14009	D6-471	831-471	UC-5347		K-1347	
C34	1000		14031	DD-102	801-001	DC-521		K-1210	
C35	1000		14031	DD-102	801-001	DC-521		K-1210	
C36	2.2		4069	TCZ-2.2	NP0K-2R2			KR-1350	
C37	150	500				MCB236			
C38	470		14009	D6-471	831-471	UC-5347		K-1347	
C39	1000		14031	DD-102	801-001	DC-521		K-1210	
C40	470		14009	D6-471	831-471	UC-5347		K-1347	
C41	1000		14031	DD-102	801-001	DC-521		K-1210	
C42	1000		14031	DD-102	801-001	DC-521		K-1210	
C43	1000		14031	DD-102	801-001	DC-521		K-1210	
C44	10			D6-100	GP1K-100	UC-541		K-1410	Note 3
C45	5000		4029	DD-502	811-005	DC-525	IMP6-D5	C-1250	
C46	.01	600		D6-103	GP2-333-103	PT611	IMP6-S1	330611	
C47	30	1000							Note 4
C48	.22	400				PT4022	IMP4-P22	3304022	
C49	.22	400				PT4022	IMP4-P22	3304022	
C50	470	3000		DD30-471	3KV-471			K-4447	

PROPERTY OF
L. F.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA HOFFMAN PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C51	5000		4029	DD-503	811-005	DC-525	IMPE-D5	C-1250	
C52	47	200				DT4047	IMP2-P47	3302047	
C53	22	200	4131			DT4022	IMP2-P22	3302022	
C54	5000		4029	DD-503	811-005	DC-525	IMPE-D5	C-1250	
C55	2-2		4089	TCZ-2.2	NPOA-2R2				
C56	68	3000	4046	DD30-680	3KV-680			K-4468	
C57A	4000		4036	DD2-402	822-004	DCD-524		C-1240	
B	4000							C-1240	
C58	680	500	4042	D6-681	GP2K-681			K-1268	
C59	.001	400	4174	D6-102	GP2L-102	DT521	IMPE-D1	330521	
C60	5000		4029	DD-503	811-005	DC-525	IMPE-D5	C-1250	
C61	220		4208	D6-221	811-331	UC-5222	IMPE-T25	K-1232	
C62	.0047	400	4127	D6-472	GP2-333-472	DT6247	IMPE-D47	3306247	
C63	.047	400	4140	DF-503		DT4147	IMP4-S47	3304147	
C64	.0047	400	4127	D6-472	GP2-333-472	DT6247	IMPE-D47	3306247	
C65	.0047	400	4127	D6-472	GP2-333-472	DT6247	IMPE-D47	3306247	
C66	.033	400	4152			DT4133	IMP4-S33	3306133	
C67	.047	400	4148	DF-503		DT4147	IMP4-S47	3304147	
C68	.033	400	4152			DT4133	IMP4-S33	3306133	
C69	.047	400	4148	DF-503		DT4147	IMP4-S47	3304147	
C70	.047	200	4158	DF-503		DT4147	IMP2-S47	3302147	
C71	.0047	400	4127	D6-472	GP2-333-472	DT6247	IMPE-D47	3306247	
C72A	3000					DT622	IMPE-D2	330622	
B	5000		#9695	#PC-100	#1405-01	DT625	IMPE-D5	330625	
C	5000					DT625	IMPE-D5	330625	
C73	.0039	400	4143			MCB463		CR-1239	
C74	.047	200	4158	DF-503		DT4147	IMP2-S47	3302147	
C75	.22	600	4129			DT6322	IMPE-P3	3306922	Note 1
C76	.1	600	4144	DF-104		DT601	IMPE-P1	330601	
C77	.1	600	4144	DF-104		DT601	IMPE-P1	330601	
C78	.022	600	4124	DF-203	817-02	DT6122	IMPE-S22	3306122	Note 1
C79	.022	600	4124	DF-203	817-02	DT6122	IMPE-S22	3306122	
C80	.001	400	4175	D6-102	GP2L-102	DT521	IMPE-D1	330431	
C81	.001	400	4175	D6-102	GP2L-102	DT521	IMPE-D1	330431	
C82	.0033	400		D6-332	GP2-333-332	DT6233	IMPE-D33	3306333	Note 1
C83	.0047	400	4185	D6-472	GP2-333-472	DT6247	IMPE-D47	3306247	
C84	.047	200	4158	DF-503		DT4147	IMP2-S47	3302147	
C85	3900	500	4085			MCB463		CR-1239	
C86	470	500				MCB245		KR-1347	
C87	.001	400	4175			MCB255		KR-1210	
C88	390	500				MCB343		KR-1339	Note 5
C89	5000		4029	DD-502	811-005	DC-525	IMPE-D5	C-1250	
C90	.1	600	4144	DF-104		DT601	IMPE-P1	330601	
C91	.47	200	4173			DT4047	IMP2-P47	3302047	Note 1
C92	.1	600	4144	DF-104		DT601	IMPE-P1	330601	Note 1
C93	140	3000							
C94	.047	600	4133	DF-503		DT6147	IMP6-S47	3306147	Note 2
C95	.033	600	14128			DT6133	IMP6-S3	3306133	Note 2
C96	.1	600	4144	DF-104		DT601	IMP6-P1	330601	Note 2

Note 1. Not used in Ch. 408-21
Note 2. Not used in Ch. 408-21N and 410-24.
Note 3. Some versions use 54MF in this application.
Note 4. Some versions use 474MMF in this application.
Note 5. Chassis 408-21 use 470MMF in this application.
Note 6. Chassis 408-21N use 104PFD in this application.
* Connect units in series.
# Items C72A, C72B, C72C, R88A, R88B, and R88C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA HOFFMAN Part No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500Ω	½	H-4813	*Q2-535			UR8S	Contrast - Panel - Note 8
B	2Meg	½						Vol. & Sw. tapped at 1, 2Meg & 800KΩ - Rear Base
R2A	2Meg	½	H-4976	Q11-139	A47-2Meg-S	B-75	U-56	Attach to R2A
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	215KΩ	½	H-4979	Q11-157	A47-25K-S	AB-28	U-38	Horiz. Hold - Note 1
B	Shaft		Not Req.	Not Req.	RSS-3	AK-4	Not Req.	Attach to R3A
R4A	30000	2	H-4984	WK-3000	A43-3000		R350L	Vert. Linearity (Wire Wound)
B	Shaft		Not Req.	Not Req.	FKS-1/4		Not Req.	Attach to R4A - Note 2
R5A	1Meg	½	H-4980	Q11-137	A47-1Meg-S	AB-89	U-54	Sync Stabilizer - Notes 3 & 7
B	Shaft		Not Req.	Not Req.	RSS-3	AK-4	Not Req.	Attach to R5A
R6	50KΩ	½	H-4967					Brightness & Photo Switch
R7A	2Meg with 100KΩ #209	½	H-4981	Q11-139	A47-2Meg-S	BX-75	SU-56	Vert. Size - Notes 4 & 5
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R7A
R8A	1Meg	½	H-4980	Q11-137	A47-1Meg-S	AB-89	U-54	Vert. Hold - Note 3
B	Shaft		Not Req.	Not Req.	RSS-3	AK-4	Not Req.	Attach to R8A
R9A	2Meg	½	H-4976	Q11-139	A47-2Meg-S	B-75	U-56	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R9A
R10A	50KΩ	½	H-4964	Q11-123	A47-50K-S	BX-31	SU-35	Max. Performance Selector
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R10A
R11A	250KΩ	½	H-4859	Q11-130	A47-250K-S	AB-28	SU-39	Horiz. Drive - Note 1
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R11A
R12	2Meg	½	H-4964					Focus - Note 6

Note 1: Some versions may use an alternate control part no. 4902.
Note 2: Some versions may use an alternate control part no. 4966.
Note 3: Some versions may use an alternate control part no. 4963.
Note 4: Some versions may use an alternate control part no. 4965.
Note 5: Connect a 100KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (Control viewed from shaft end, terminals down.)
Note 6: Not used in all versions.
Note 7: Some versions may use an alternate control part no. 4911.
Note 8: Some versions may use an alternate control part no. 4992.
* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: BU-103 & P1-204 (PANEL)
BU-139BX & RU-223 (REAR)
76-1 SWITCH

RESISTORS

ITEM No	RATING OHMS	RATING WATT	REPLACEMENT DATA HOFFMAN Part No	IRC PART No.	NOTES
R13	47KΩ	½		BTS-47K	
R14	15KΩ	½		BTS-15K	
R15	100KΩ	½		BTS-100K	
R16	470Ω	½		BTS-470	
R17	150KΩ	½		BTS-150K	
R18	270KΩ	½		BTS-270K	
R19	15KΩ	½		BTS-15K	
R20	220KΩ	½		BTS-220K	
R21	15KΩ	½		BTS-15K	
R22	10KΩ	½		BTS-10K	
R23	4700Ω	½		BTS-4700	
R24	1000Ω	½		BTA-1000	
R25	100Ω	½	4618	BTS-100	
R26	470Ω	½	4664	BTS-470	
R27	470Ω	½	4638	BTS-470	
R28	33Ω	½	4698	BTS-33	
R29	47Ω	½	4639	BTS-47	
R30	470Ω	½	4664	BTS-470	
R31	120Ω	½	4646	BTS-120	
R32	470Ω	½	4664	BTS-470	
R33	470Ω	½	4664	BTS-470	
R34	22KΩ	½	4628	BTS-22K	
R35	47Ω	½	4639	BTS-47	
R36	470Ω	½	4664	BTS-470	
R37	8200Ω	½	4651	BTS-8200	
R38	180Ω	½	14618	BTS-180	
R39	470Ω	½	4664	BTS-470	
R40	12KΩ	5%	4646	BTS-12K	5%
R41	33KΩ	½	24627	BTS-33K	
R42	4700Ω	5%	4578	BTS-4700	5%
R43	33Ω	½	4698	BTS-33	
R44	220KΩ	½		BTA-220K	
R45	22KΩ	½	4501	BTS-22K	
R46	15KΩ	½		BTS-15K	Note 3
R47	1.5Meg	5%	34603	BTS-1.5Meg	5%
R48	470KΩ	½	4623	BTS-470K	
R49	3.3Meg	5%	34630	BTS-3.3Meg	5%
R50	130KΩ	½	4548	BTS-130K	
R51	18KΩ	½		BTS-18K	
R52	47KΩ	½		BTS-47K	
R53	1500Ω	½		BTS-1500	
R54	3300Ω	½		BTS-3300	
R55	470KΩ	½		BTS-470K	
R56	330Ω	½		BTS-330	
R57	15KΩ	½	4521	BTS-15K	
R58	180Ω	½	4618	BTS-180	
R59	2200Ω	½	4660	BTS-2200	
R60	180Ω	½	14618	BTS-180	
R61	33KΩ	½	4598	BTA-33K	
R62	10KΩ	5%	4597	BTS-10K	5%
R63	10KΩ	5%	4597	BTS-10K	5%
R64	39KΩ	½		BTS-39K	
R65	680KΩ	½	4555	BTS-680K	
R66	47KΩ	½	4604	BTA-47K	
R67	10Meg	½	4505	BTS-10Meg	
R68	470KΩ	½	4606	BTS-470K	
R69	10Meg	½	4505	BTS-10Meg	

ITEM No	RATING OHMS	RATING WATT	REPLACEMENT DATA HOFFMAN Part No	IRC PART No.	NOTES
R70	470KΩ	½	4606	BTS-470K	
R71	33KΩ	½	4586	BTS-33K	
R72	270KΩ	½	4602	BTS-270K	
R73	100KΩ	½	4571	BTS-100K	
R74	27KΩ	11	14639		
R75	270KΩ	½	4602	BTS-270K	
R76	1.8Ω	1			Note 1
R77	100KΩ	½	4511	BTA-100K	
R78	22KΩ	½	4501	BTS-22K	
R79	1.5Meg	½	4605	BTS-1.5Meg	
R80	15KΩ	2	4085	BTH-15K	
R81	390KΩ	½	4633	BTS-390K	
R82	680Ω	½		BTS-680	
R83	180Ω	½	4540	BTS-180	
R84	1800Ω	5%	24517	BTS-1800	5%
R85	33Ω	½	14544	BTS-330	
R86	220Ω	½	4650	BTS-2200	
R87	2200Ω	5%	24625	BTS-2200	5%
R88A	22KΩ	½		BTS 22K	
B	820Ω	½	#9695	BTS 8200	
C	8200Ω	½		BTS-8200	
R89	4.7Meg	½	4544	BTS-4.7Meg	
R90	100Ω	½	4659	BTS-1000	
R91	180KΩ	1	34507	BTA-180K	
R92	1.3Meg	1	34593	BTS-1.3Meg	
R93	680KΩ	1	34571	BTA-680K	
R94	560Ω	½	4629	BTS-5600	
R95	470Ω	½	4664	BTS-470	
R96	100Ω	½	4547	BTS-100	Note 2
R97	120Ω	½	4546	BTS-120	
R98	4700Ω	5%	4576	BTS-4700	5% Note 2
R99	560Ω	½	4507	BTS-560	
R100	560Ω	½	4507	BTS-560	
R101	100KΩ	½	4571	BTS-100K	
R102	100KΩ	½	4571	BTS-100K	
R103	470KΩ	½	4623	BTS-470K	
R104	68KΩ	½	24682	BTA-68K	Note 2
R105	4.7Meg	½	4544	BTS-4.7Meg	
R106	150Ω	½	4630	BTS-1500	
R107	560Ω	½	4679	BTS-5600	
R108	100Ω	½		BTS-1000	
R109	100KΩ	½	4571	BTS-100K	
R110	120KΩ	½	4548	BTS-120K	
R111	8200Ω	½	4651	BTS-8200	Note 6
R112	100Ω	½	4547	BTS-100	Note 2
R113	470KΩ	½	4623	BTS-470K	
R114	120Ω	2	4657	BTS	Note 2
R115	18KΩ	3	4631	BTS-18K	Note 5
R116	10KΩ	1	4625	BTA-10K	Note 5
R117	2.7Ω	½	4783		
R118	33KΩ	½	4586	BTS-470	
R119	7.5Ω	7½	4798		
R120	120Ω	15	4784		
R121	1300Ω	20	4772		
R122	330KΩ	½	4677	BTS-330K	
R123	4.7Meg	½		BTS-4.7Meg	
R124	150KΩ	½		BTS-150K	Note 3
R125	22Ω	½		BTS-22	Note 4

Note 1: Chassis 408-21 uses a 2, 2Ω resistor in this application.
Note 2: Not used in chassis 408-21.
Note 3: Used only in chassis 408-21.
Note 4: Chassis 408-21 uses a 10KΩ resistor in this application.
Note 5: Chassis 408-21 uses a 470Ω resistor in this application.
Note 6: Chassis 408-21 uses a 560Ω resistor in this application.
* Items R88A, R88B, R88C, C72A, C72B and C72C are combined in one unit.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA HOFFMAN Part No.	Stancor Part No.	Merit Part No	Triad Part No	RCA TYPE No.	Halldorson Part No	Thordarson Part No.
T1	117VAC @ 1.9A	124VAC @ 320ADC	6.3VAC @ 1.2A	5055-1						
	SEC 3	SEC 4	SEC 5							
	6.3VAC @ 11.2A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA HOFFMAN PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Horiz. Output Trans.	518A 1	FB419 6 RF800*		2357I 6 214RI*	X094 6 200RI4*		FLY-16 6 WC-20*	D-50 6 WC-12*
T2	Horiz. Output Trans.	5184 ③	HVO-8*		230TI*	X080*	A-8137 6 WC-5*	FLY-18*	D-19*
T3	Vert. Output Trans.	5188-4 ①				V302 5 V302 6	A-8142 5 A-8142 6	26572 6 26572	A-103X 6 A-103X
T3	Vert. Output Trans.	5188A ③	21805 6	A-3039 5	228TI 5	V312 5	A-8141 5	26564 6	A-104X 6
T4A	Yoke (90°) Horiz(12.5MH)	5121A ①	DF605 5	MDF-91 5	219DI 5		DY-13A 5	Y-14 5	Y-50-1 5
B	Vert (40MH)								
T4A	Yoke (70°) Horiz(8.5MH)	9729 ③	DF605 7	MDF-73 5	222DI 7	Y70F20/43	DY-11A 5	Y-9 5	Y-22-1 5
B	Vert(37MH)								
T5	Width Coil (8.6-34MH)	5571 ⑯	RF800 ⑫	MWC-4 ⑫	215RI	20IRI0 ⑫	WC-5 ⑫	WC-20 ⑫	WC-11 ⑫
T5	Width Coil (2.8-18MH)	5484 ⑪	RF800 ⑫	MWC-4 ⑫	212RI	20IRI6	WC-5 ⑫	WC-18 ⑫	WC-12 ⑫

1 For 90° chassis - 410-24, 410-24B and 408-21N.
2 For 70° chassis - 408-21, 408-21B and 408-21L.
3 Alternate vert. output trans. for 90° chassis only.
4 Drill new mounting hole(s).
5 Use original horiz. yoke damping network if necessary.
6 Use original yoke damping network.
7 See instructions packed with unit pertaining to yoke damping network.
8 Connect horiz. damping network across terms #3 & #7. Use original if necessary.
9 Remove capacitor from terms #1 & #2. Use original horiz. damping network if necessary.
10 May be used in all chassis.
11 Alternate width coil for all chassis.
12 Enlarge mounting hole.
13 Connect to terms #1 & #2.
14 Connect to coded red & blue terms.
15 Connect to terms #3 & #4.

FOR PART NO. 518A (90°)
***HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA**
Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	9	9		9	9		9	9
	7	7		7	7		7	7
	5	5		5	5		5	5
	4	4		4	4		4	4
	3	3		3	3		3	3
	1	1		1	1		1	1
	RF800 Term #3		214RI Term 'C'	201RI4 Outer Winding			WC-20 Term #1	WC-11 Orange term
	RF800 Term #4		214RI Term 'D'	201RI4 Outer Winding			WC-20 Term #2	WC-11 Black term
Connect Width Coil Across	3 & 1	RF800 terms #1 & #2 across 3 & 1		201RI4 Inner Winding across 3 & 1		WC-20 terms #3 & #4 across 3 & 1		WC-11 Red & Blue terms across 3 & 1
Special Notes		14		12	10		12	12

16 If the picture is out of phase, reverse width coil primary or secondary.

FOR PART NO. 5184 (70°)
***HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA**
Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	9	9	9	9	9	7	9	9
	8	8	8	8	Jumper 7 & 8	4	8	Jumper 7 & 8
	7	7	7	7	5 or 4	7	7	7 & 8
	5	5	5	5	7	See Note ⑰	5	4
	4	4	4	4	3	3	4	7
	3	3	3	3	1	1	3	3
	1	1	1	1	3		1	1
Connect Width Coil Across	3 & 1	3 & 1	3 & 1	3 & 1	1 & 3	WC-5 Orange & Blk. Terms across 1 & 3	3 & 1	3 & 1
Special Notes		14		12	10		12	12

17 Connect red and blue terminals of WC-5 between C50 (original term #5 connection) and chassis ground. If AGC does not function properly, reverse these connections.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA HOFFMAN PART No	Stancor PART No.	Merit PART No.	Triad PART No	Halldorson PART No.	Thordarson PART No	NOTES
T6	7.5KΩ	3.4Ω Tap & 2.1Ω	5117A 5188 ①						1 Used in models 21M351L, 21B353L, 21P353L, 21M728L, 21M729L, 21P731L, 21M351N, 21B353N, 21P353N, 21M728N and 21P731N

HOFFMAN MODELS 21B352, U, 21B352L, U, 21B352N, NU, 21H729, U, 21H351, U, 21M351, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P352, U, 21P352L, LU, 21P352N, NU, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M356, U, 24P356, U, 24U211, U, (CH. 408-21, B, L, N, 410-24B)

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	HOFFMAN PART No.	JENSEN PART No.	QUAM PART No.	
SP1	7 X 11"	PM	3.4Ω	9079			
SP2	7 X 11"	PM	3.4Ω	9079			
SP3	5 1/4"	PM	3.4Ω	9091	ST-803 Mod. P525-V	52A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	HOFFMAN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	IF Trap	0Ω						Wound on 68MMF Cap.
L2	IF Trap	0Ω						Wound on 68MMF Cap.
L3	Ant. Coils	0Ω CT	0Ω					
L4	RF Coil	.9Ω						
L5	Fil. Choke	0Ω						
L6	Neut. Coil	0Ω						
L7	RF, Mixer Grid & Osc. Coils	0Ω						
L8	Fil. Choke	0Ω						
L9	RF Choke	0Ω						
L10	Feedback Coil	1.3Ω						
L11	Conv. Plate	0Ω						
L12	39.75MC Trap	0Ω						
L13	47.25MC Trap	0Ω		5241A	20-1049	TV-153	6226	
L14	1st. Video IF	.1Ω		5243A		TV-130	6231 *	
L15	2nd. Video IF	.1Ω	.1Ω	5538	17-4531 ■		6233 ▲	
L16	3rd. Video IF	.1Ω	.1Ω	5538	17-4531 ■		6232 ▲	
L17	41.25MC Trap	0Ω		5438				
L18	4th. Video IF	.1Ω	.1Ω	5538	17-4531 ■		6234	
L19	5th. Video IF	.1Ω	.1Ω	5242A	17-4503 ■	TV-130	6234	
L20	Series Peaking Coil	7.5Ω		5545	19-3100 ♦	TV-181 ♦	4642 ♦	105 Microhenries, wound on 10Meg resistor
L21	Shunt Peaking Coil	16Ω		5340	19-3300 ♦		4648 ♦	350 Microhenries, wound on 10Meg resistor
L22	Series Peaking Coil	14Ω		5547	19-3180 ♣	TV-181 ♣	4642 ♣	105 Microhenries, wound on 8.2KΩ resistor Note 1
L23	Shunt Peaking Coil	16Ω		5548	19-3180 ♦	TV-184 ♦	6154 ♦	210 Microhenries wound on 10Meg resistor
L24	4.5MC Trap	2.4Ω		5211A	20-1004	TV-151	1469	
L25	Sound IF	1Ω		5454	17-3400	TV-151	1469	
L26	Ratio Det.	3.8Ω	0Ω CT	5235A	17-3493	TV-110	1468	Tertiary winding -.4Ω
L27	Horiz. Osc.	65Ω		5447	19-1576	TV-163	6210	
L28	RF Choke	0Ω		5266	19-1003		4608	4 Microhenries
L29	Crossover Choke	0Ω						

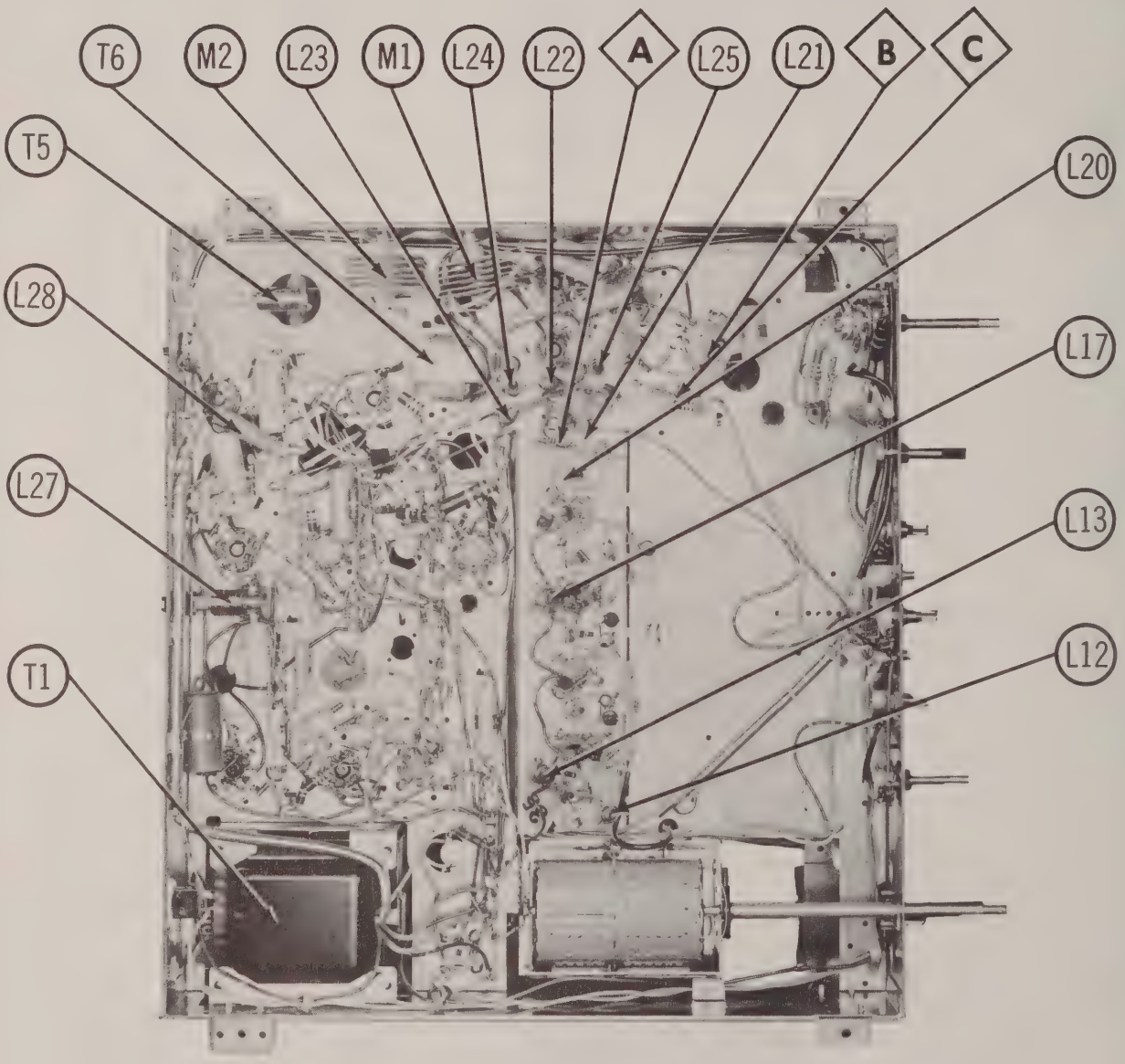
Note 1. Some versions use an alternate peaking coil part #5433 wound on a 12KΩ resistor.
* Use one winding only.
■ Detune trap and drill mounting holes.
▲ Detune trap.
♦ Parallel with 10Meg resistor.
♣ Parallel with 8.2KΩ resistor.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	HOFFMAN PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.320A	10010 10009 ① 99735 ① 9735 ②	1241A	RS400	6S450	400	5S2	① Alternate selenium rectifiers.
M2	.320A	10010 10009 ① 99735 ① 9735 ②	1241A	RS400	6S450	400	5S2	② Used in chassis 408-21.

MISCELLANEOUS

ITEM No.	PART NAME	HOFFMAN PART No.	NOTES
M3	Dial Light	9505	#51
M4	Tuner	9839	VHF-(VHF Models only) Ch. 408-21N
	Tuner	9786	VHF (VHF Models only) Ch. 408-21 and 410-24
M5	Tuner	9838	VHF-UHF (VHF-UHF Models only) Ch. 408-21N
	Tuner	9814	VHF-UHF (VHF-UHF Models only) Ch. 408-21 and 410-24
M6	Switch	6043	Speaker - earphone (DPDT - Slide Type)
M7	Focus Magnet	9789	Includes centering device -Ch. 410-24, 408-21N
M8	Centering Magnet	9722	Ch. 408-21
M9	Ion Trap	9702	Ch. 408-21N, 408-21
	Ion Trap	9694	Ch. 410-24



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T5, C92, C90, C91, R115, L28 and other associated components.	Check L27, C85, C86, C89, R110, R108, R106 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19 and V20. Check M1 and M2. Check T2, R119, R115, R114, C89 and other associated components.

BLOOMING

Check by substitution V19, V20 and V21. Check M1 and M2. Check T2, T4A, R119, R115, C89, C91 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

PRODUCTION CHANGES

IMPROVING PICTURE BRIGHTNESS AND FOCUS

Improved picture brightness and focus in chassis 407-21N, 208-21N and 410-24 may be accomplished by moving the orange lead (pin 10 of V22) from the junction of R97, C5 and the red lead of T3 to the junction of R116 and C75 (boost).

This change can be made in all "N" models and 24" models using the 90° deflection circuit.

It is not necessary to make this change on chassis 407 and 408 using the 70° deflection circuit.

HOFFMAN MODELS 21B352, U, 21B352L, LU, 21B352N, NU, 21B729, U, 21M351, U, 21M351L, LU, 21M351N, NU, 21M728, U, 21M728L, LU, 21M729N, NU, 21P353, U, 21P353L, LU, 21P353N, NU, 21P730, U, 21P731, U, 21P731L, LU, 21P731N, NU, 21U208, U, 21U208N, NU, 24B732, U, 24M354, U, 24P356, U, 24P733, U, 24U211, U, (Ch. 408-21, B, L, N, 410-24B)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

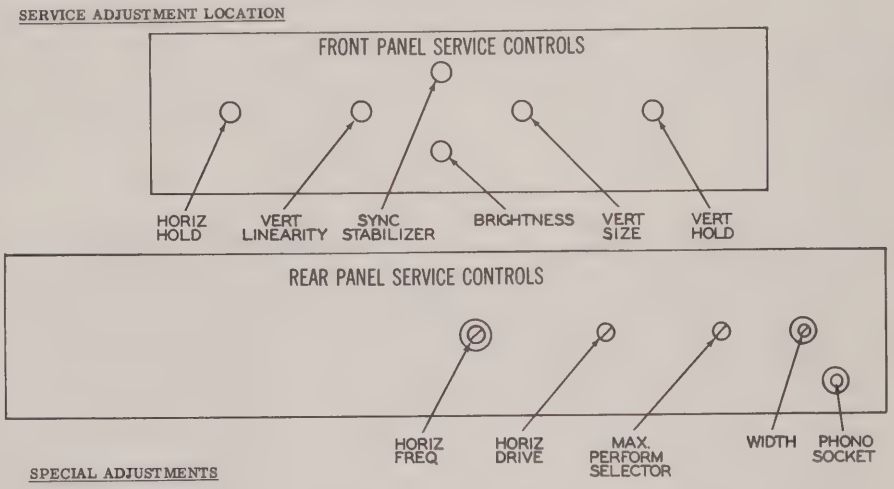
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 wood screws holding metal strip (molding) at top of safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS

SYNC STABILIZER

The sync stabilizer control (R5) is located on front panel of chassis. Adjust R5 at point where sync is stable.

MAXIMUM PERFORMANCE SELECTOR

The maximum performance control (R10) is located on rear panel of the chassis. Adjust R10 for MINIMUM snow in picture.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L27) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L26) located on top of chassis. (See tube placement chart.)

CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. focusing assembly. Adjust the centering lever from side to side and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 6 push-on type control knobs from front panel of cabinet.
2. Remove 5 wood screws and 1 metal screw from rear cover. Remove rear cover.
3. Disconnect built-in antenna.
4. Disconnect speaker plug.
5. Remove 2 wood screws from rear chassis mounting brackets.
6. Remove 4 chassis bolts. Remove chassis.

NOTE: Under side of chassis may be serviced by removing 1 wood screw and bracket. Slide out chassis bottom cover.

SPEAKER REMOVAL

1. Remove speaker leads.
2. Remove 4 wood screws from each speaker and 1 wood screws from crossover net.
3. Remove 3 speakers.

REMOVAL OF SPEAKER SWITCH ASSEMBLY (IF USED)

1. Remove speaker leads and chassis plug.
2. Remove 4 wood screws.
3. Remove switch assembly.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PROPERTY OF
L. F. BLANKENSHIP
3924 BLAKE ST.
DENVER, COLORADO

MOTOROLA MODELS
54HF1, B (Ch. HS-443)

MOTOROLA MODELS
54HF1, B (Ch. HS-443)

TRADE NAME	Motorola Models 54HF1, 54HF1B (Ch. HS-443)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Illinois
TYPE SET	AC Operated Phono amplifier with 3 Speed Automatic Record Changer
TUBES (Four)	Types 12AX7 AF Amp., 6C4 Phase Inverter,(2) 50C5 Output
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .31 Amp. @ 117 Volts AC

RECORD CHANGER UNIT - MOTOROLA MODEL VM-4RC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

MOTOROLA
MODEL 54HF1 (Ch. HS-443)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12AX7	12AX7	9A	
V2	Phase Inverter	6C4	6C4	6BG	
V3	Audio Output	50C5	50C5	7CV	
V4	Audio Output	50C5	50C5	7CV	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	■40	150	23B632092			FP311.5	TM-T40-150	T-045	
B	▲40	150							
C	30	150							
C2	10000		21R482726	DD-103	811-01	DC-511	IMP4-S1	330411	Note 1
C3	.02	200	8K121003	DF-203	817-02	PT412	IMP4-S2	330402	Note 2
C4	.02	200	8K121003	DF-203	817-02	PT412	IMP4-S2	330402	
C5	4700		21K121764	DD-472	811-005	DC-525	IMP6-D47	C-1247	
C6	.0082	400	8K490225					3306282	
C7	330		21R115906	D6-331	GP2K-331	UC-5333		K-1333	
C8	1000		21A121678	DD-102	801-001	DC-521		K-1210	
C9	10000		21R482726	DD-103	811-01	DC-511	IMP6-S1	330611	
C10	.05	400	8R121567	DF-503		PT415	IMP4-S5	330415	
C11	.05	400	8R121567	DF-503		PT415	IMP4-S5	330415	
C12	1000		21A121678	DD-102	801-001	DC-521	IMP6-D1	K-1210	
C13	.082	400	8K490235					3306182	Note 2
C14	.15	400	8K119354			PT4015	IMP4-P15	3304015	Note 3

Note 1. Some versions may use .082MFD in this application (part #8K490235).
Note 2. Not used in some versions.
Note 3. Some versions may use .1MFD in this application (part #8K490236).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	18A632090	Q13-139	A47-2Meg-Z	B-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
R2A	1Meg	½	18A632091	Q13-137	A47-1Meg-Z	B -70	U-53	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	1Meg	½	18A632091	Q13-137	A47-1Meg-Z	B-70	U-53	Treble
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A

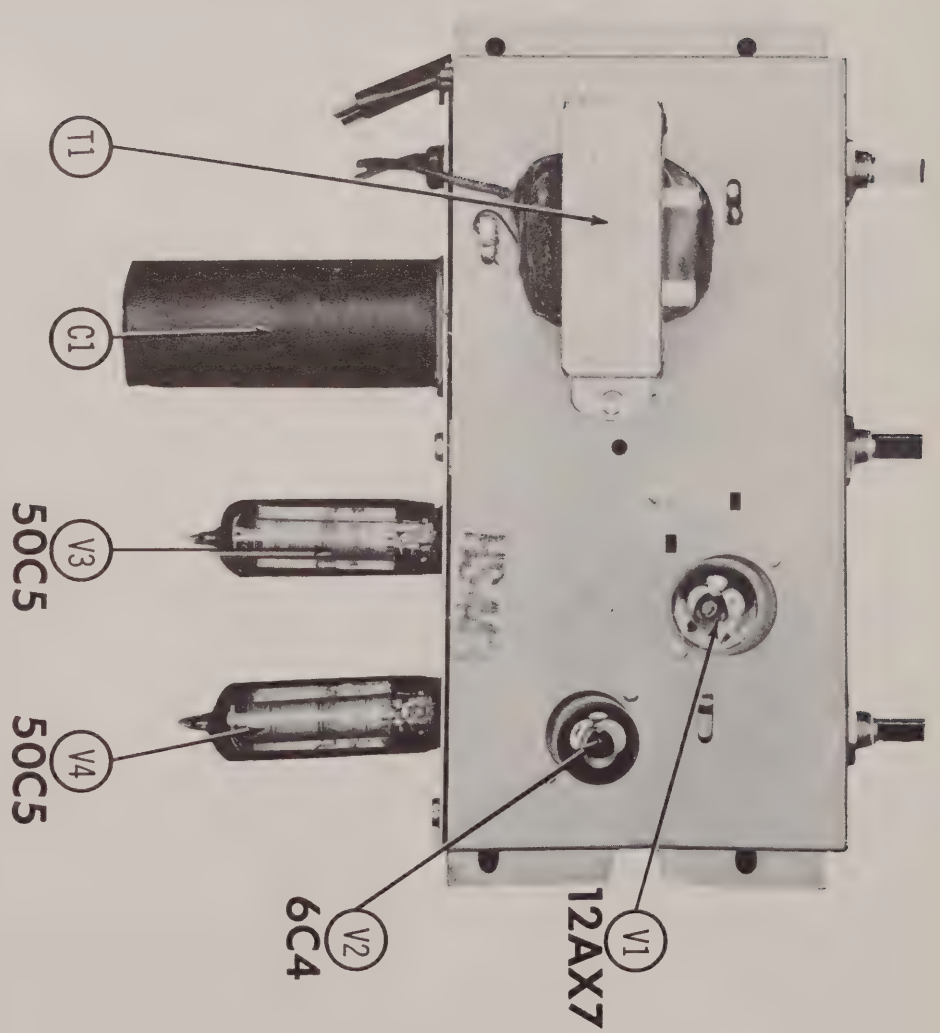
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R4	39KΩ	½	6R6487	BTS-39K	Note 1
R5	470KΩ	½	6R6032	BTS-470K	
R6	33KΩ	½	6R6012	BTS-33K	Note 1
R7	1800Ω	½	6R2089	BTS-1800	
R8	47KΩ	½	6R6056	BTS-47K	
R9	470KΩ	½	6R6032	BTS-470K	
R10	47KΩ	½	6R6048	BTS-47K	
R11	6800Ω	½	6R6428	BTS-6800	
R12	100KΩ	½	6R6075	BTS-100K	
R13	470KΩ	½	6R6377	BTS-470K	
R14	4700Ω	½	6R6080	BTS-4700	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R15	47KΩ	½	6R6048	BTS-47K	
R16	47KΩ	½	6R6048	BTS-47K	
R17	100KΩ	½	6R6031	BTS-100K	
R18	82Ω	½	6R2035	BTS-82	
R19	100KΩ	½	6R6031	BTS-100K	
R20	1800Ω	½	6R2089	BTS-1800	
R21	4700Ω	½	6R6039	BTS-4700	
R22	82Ω	2	6R488222		
R23	22Ω		65B630362		Note 2
R24	68KΩ	½	6R6001	BTS-68K	Note 1

Note 1. Not used in some versions.
Note 2. Fuse type resistor.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	4KΩ CT	6.7Ω	25C632098-C	A-3870		S-53X	Z10U	22S60	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	8"	PM	3.3Ω	50C632095		8A21	① Alternate 6" PM speaker
SP2	6"	PM	3.4Ω	50C632097 50C0632096 ①	ST-108 Mod. P6-X	6A21	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.093A	48B482807 48B632532 ①	1005A	RS150	6S150	5P1	150	① Alternate Sel. Rectifier

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	MOTOROLA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M2	720022	55-T	GD-J	47	0-1 or S-1 & 0-3	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

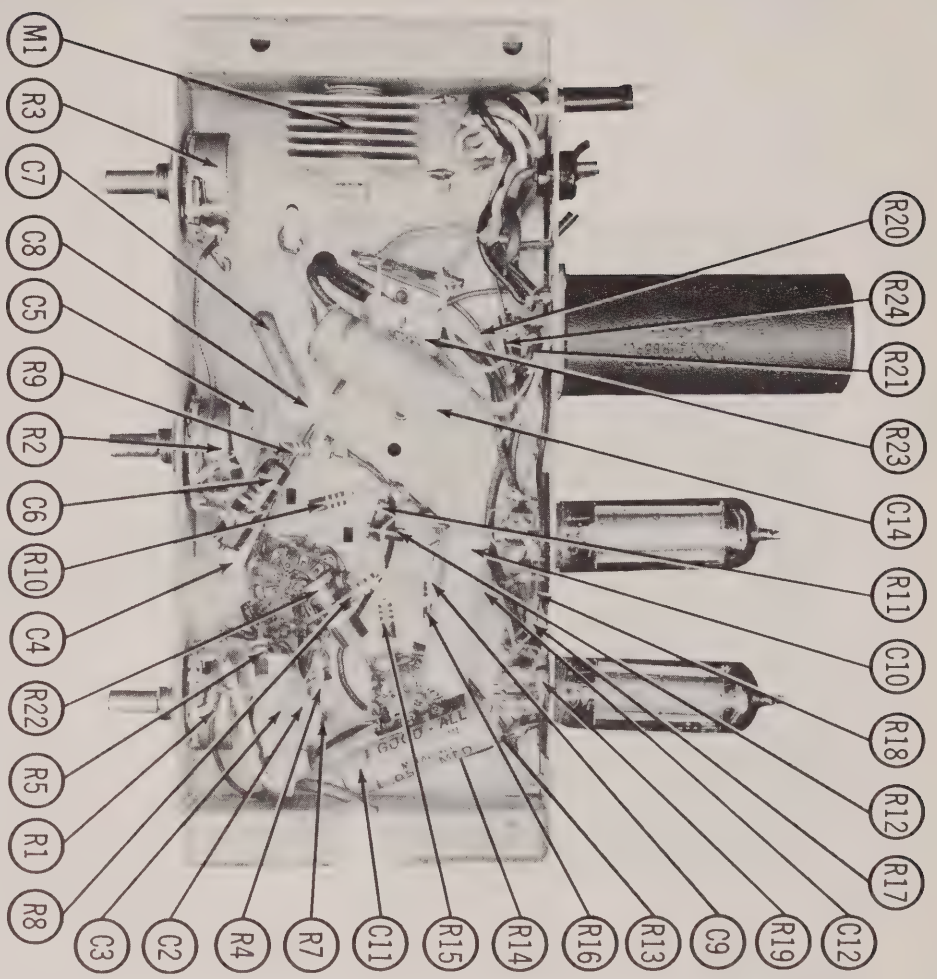
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M3		*S-67 or †S-66 or ♦†S-66SD or ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	* Metal † Jewel ♦ Diamond

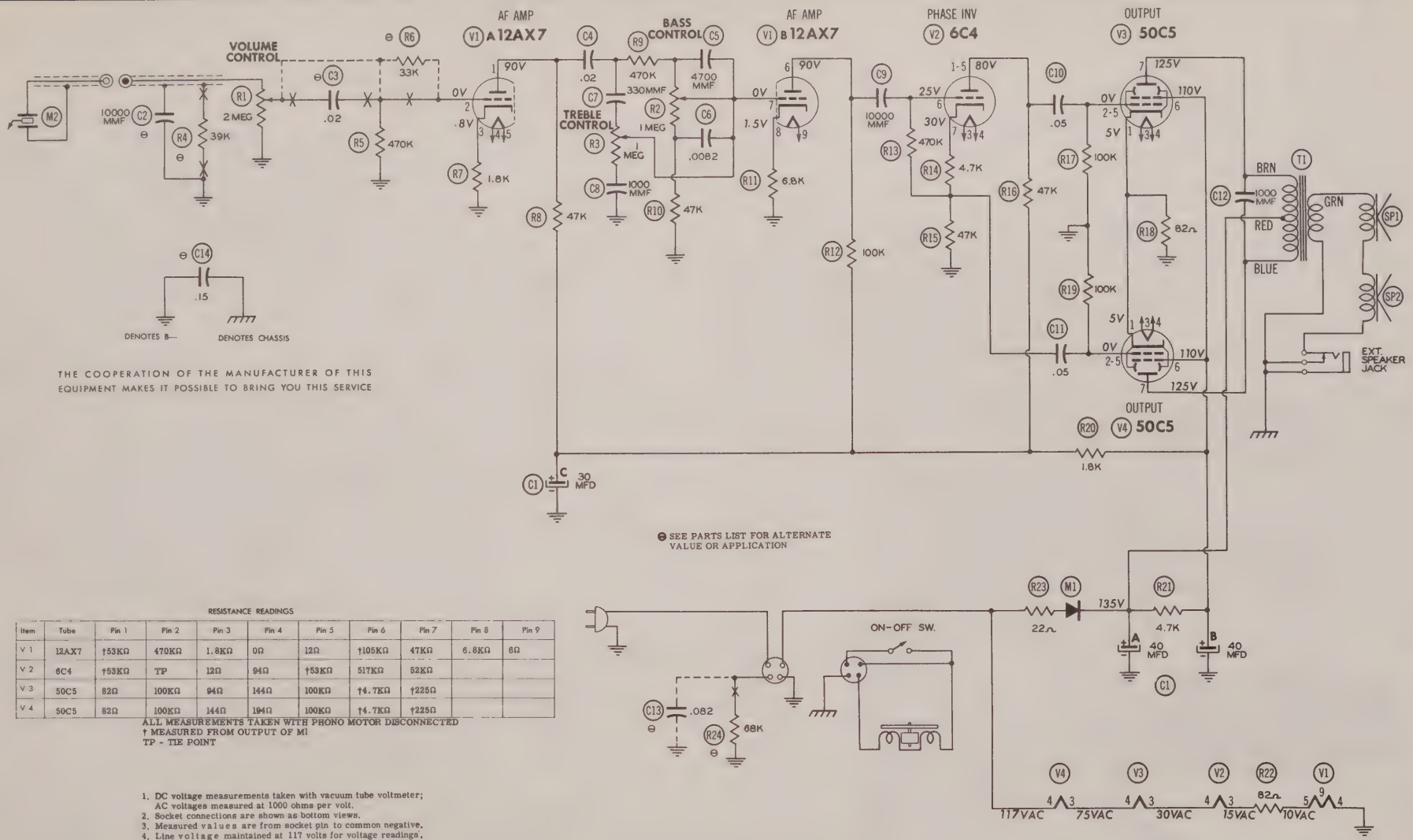
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
	Cabinet	16E632083	Model 54HF1
	Cabinet	16K632084	Model 54HF1B
	Knob	36K632088	Control - 3 used

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3074 MEADE ST.
DENVER, COLORADO



THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†53KΩ	470KΩ	1.8KΩ	0Ω	12Ω	†105KΩ	47KΩ	6.8KΩ	6Ω
V 2	6C4	†53KΩ	TP	12Ω	94Ω	†53KΩ	517KΩ	52KΩ		
V 3	50C5	82Ω	100KΩ	94Ω	144Ω	100KΩ	†4.7KΩ	†225Ω		
V 4	50C5	82Ω	100KΩ	144Ω	194Ω	100KΩ	†4.7KΩ	†225Ω		

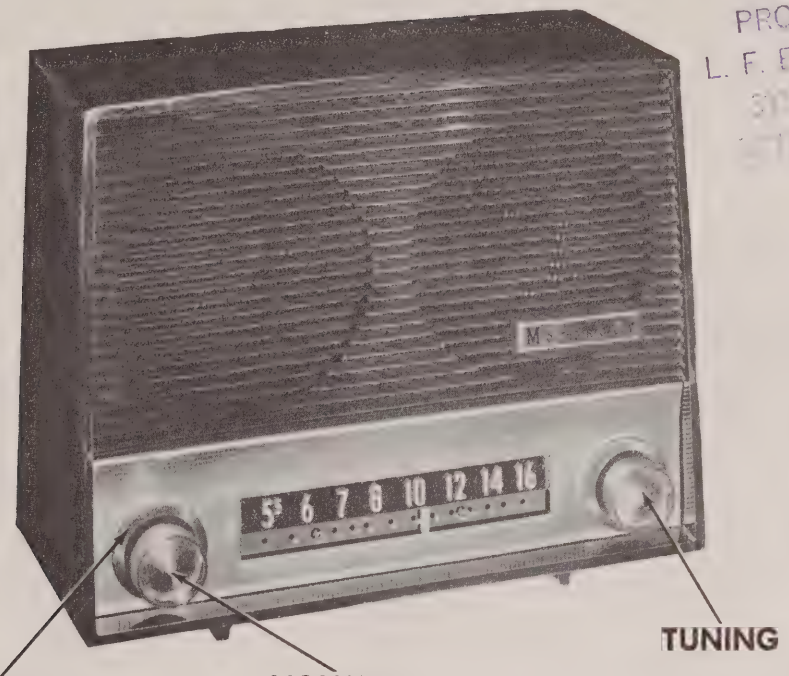
ALL MEASUREMENTS TAKEN WITH PHONO MOTOR DISCONNECTED
† MEASURED FROM OUTPUT OF M1
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

© Howard W. Sams & Co., Inc. 1955

PROPERTY OF
L. F. BLANKENSHIP
[illegible] ST.
[illegible], COLORADO

MOTOROLA MODELS
64X1, 64X2 (Ch. HS-440)



MOTOROLA MODELS
64X1, 64X2 (Ch. HS-440)

TRADE NAME	Motorola Models 64X1, 64X2 (Ch. HS-440)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Six)	Types 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det-AVC-AF Amp., 35C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
RATING	.23 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	455KC (400~ Mod)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	"	High side to antenna stator lug. Low side to chassis.	1620KC	"	"	A5	"
3	"	"	1400KC	1400KC	"	A6	"
4		Loop	"	"	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
5		"	600KC	600KC	"	A8	Adjust for maximum output while rocking tuning gang. Note - If receiver is off calibration or mistracks at low frequencies, repeat steps 2, 3, 4 and 5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

MOTOROLA
MODEL 64X1 (Ch. HS-440)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V5	Audio Output	35C5	35C5	7CV	
V6	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	150	23B484234			TCT3114	TDL-403020-150	FMT-310	
B	20	150							
C	20	150							
C2	.05	200	8R9821	DF-503		PT415	IMP2-S5	330215	
C3	100	750	21R410036	DD-101	801-101	UC-531		K-1310	
C4	10000		21R482726	DD-103	811-01	DC511			
C5A	220			DD-221	811-221	UC-5322		K-1322	
B	220			DD-221	811-221	UC-5322		K-1322	
C	2000		21B482847♦	DD-202	801-002	DC522			
D	5000			DD-502	811-005	DC525			
C6	10000		21R482726	DD-103	811-01	DC511			
C7	.005	600	8R9813	DD-502	811-005	PT625	IMP6-D5	330625	
C8	.02	400	8R9802	DF-203	817-02	PT412	IMP4-S2	330412	
C9	.05	400	8R9816	DF-503		PT415	IMP4-S5	330415	
C10	.047	400	8K490232	DF-503		PT4147	IMP4-S47	3304147	
C11	.15	200	8K72686			PT4015	IMP2-P15	3302015	
C12	.05	200	8R9821	DF-503		PT415	IMP2-S5	330215	

♦ Items C5A, C5B, C5C and C5D are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	18K632452			F1-51	UF16L	Tone - Panel - Note
B	1Meg	½				R2-59	UR16-T254	Volume tapped at 250KΩ - Rear
C	Shaft					KB-1	US-26	Attach to R1B

Note : Some versions may use an alternate control part no. 18B632452.

RESISTORS

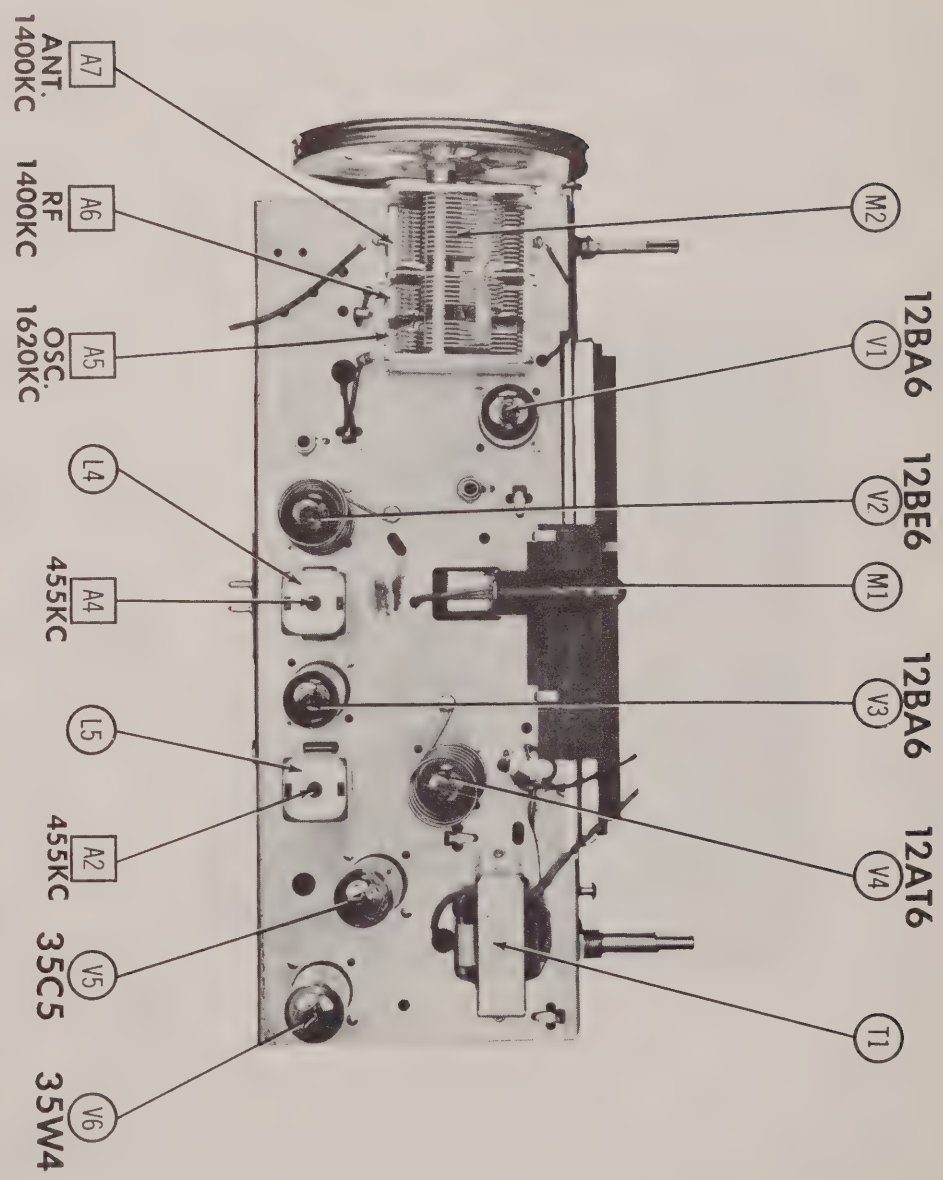
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R2	100KΩ	½	6R6075	BTS-100K	
R3	100Ω	½	6R6325	BTS-100	
R4	560Ω	½	6R6291	BTS-560	
R5	22KΩ	½	6R6028	BTS-22K	
R6	100Ω	½	6R6018	BTS-100	
R7	1Meg	½	6R6004	BTS-1Meg	
R8	3.3Meg	½	6R2118	BTS-3.3Meg	
R9	33KΩ	½	6R6012	BTS-33K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MOTOROLA PART No.	IRC PART No.	NOTES
R10	10Meg	½	6R2109	BTS-10Meg	
R11	470KΩ	½	6R6032	BTS-470K	
R12	470KΩ	½	6R6032	BTS-470K	
R13	150Ω	½	6R3992	BTS-150	
R14	1000Ω	1	6R63953	BTA-1000	
R15	100Ω	1	6R488025	BTA-100	
R16	27Ω	½	6R5683	BTS-27	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: MOTOROLA PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.44KΩ	6.8Ω	25C632819-0	A-3856			Z1001		

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3. 3Ω	50C632846 ①	ST-803	52A1	① Speakers connected in series.
				50C632453 ②	Mod. P525-V		② Alternate 5 1/4" PM speakers.
SP2	5 1/4"	PM	3. 3Ω	50K632847 ①	ST-803	52A1	
				50K632642 ②	Mod. P525-V		

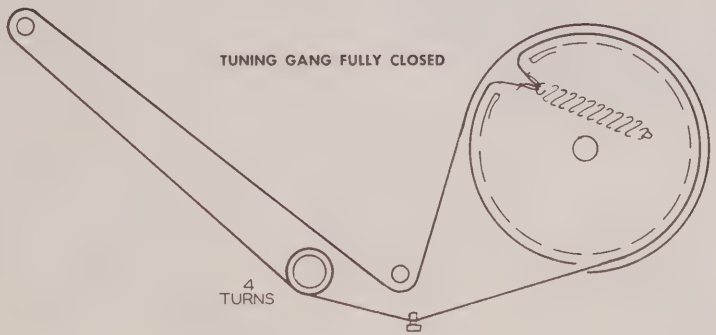
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1. 9Ω		1V632513				Includes cabinet back & line cord.
L2	RF Coil	3. 3Ω	9. 5Ω*	24B630714	14-1076			
L3	Osc. Coil	. 6Ω	9. 5Ω	24B630610	14-1073		69-Osc.	
L4	Input IF	17Ω	17Ω	24C485553	16-6758	BC-352	12-C1	
L5	Output IF	17Ω	17Ω	24C485553	16-6758	BC-353	12-C2	

* Tapped at 4. 8Ω.

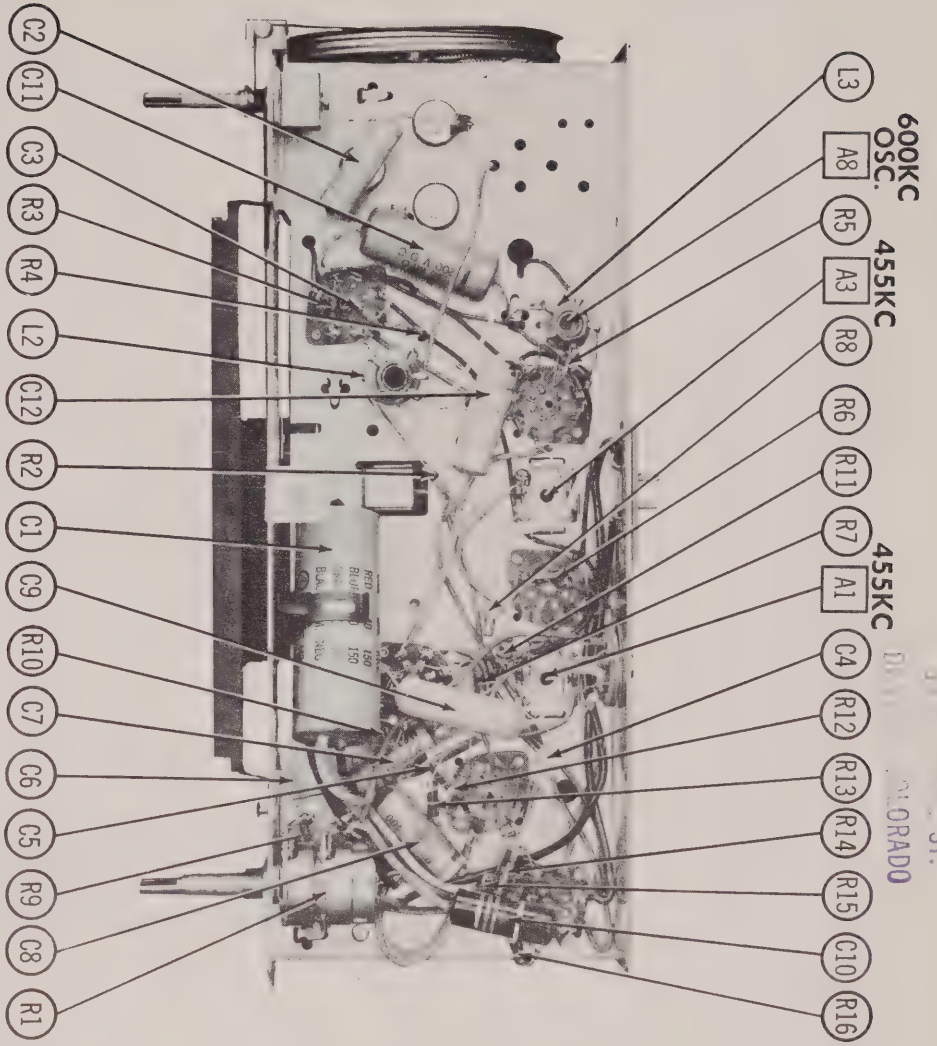
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1	Dial Light	65X11854	#47, Bayonet
M2	Tuning Cap.	19C630633	3 Gang (27-417MMF; 12-210MMF; 15-105MMF)
	Cabinet	16E632456	Model 64X1
	Cabinet	16K632492	Model 64X2
	Knob	36K632494	Tuning - Model 64X1
	Knob	36K632495	Tuning - Model 64X2
	Knob	36K632496	On-Off-Volume - Model 64X1
	Knob	36K632497	On-Off-Volume - Model 64X2
	Knob	36K632498	Tone - Model 64X1
	Knob	36K632499	Tone - Model 64X2
	Dial Scale	34C632455	
	Dial Background	13B632461	
	Pointer & Slider Assembly	52A632573	
	Name Plate	33B632103	Motorola



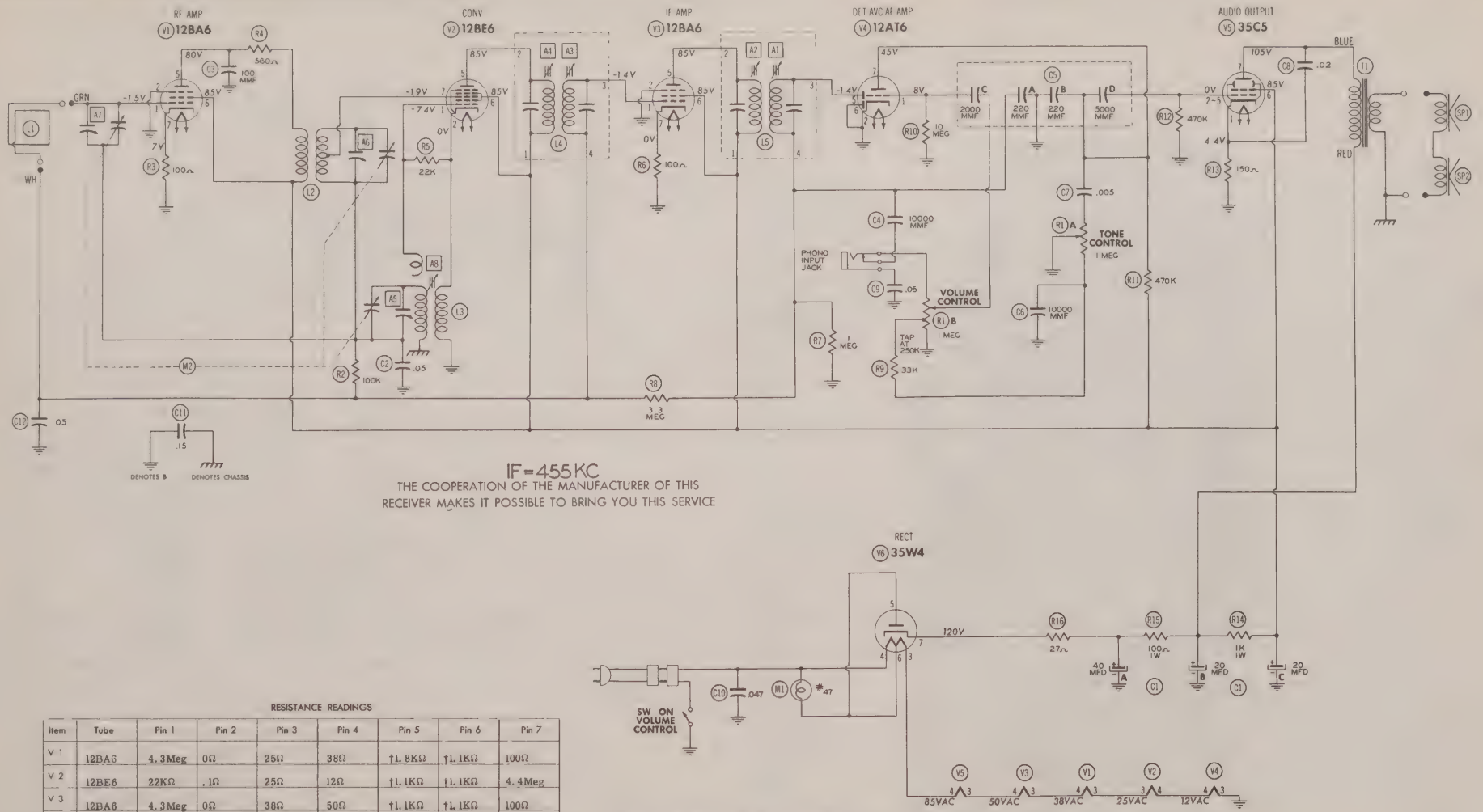
DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. [illegible]
[illegible] ST.
[illegible] COLORADO

MOTOROLA MODEL 64X1 (Ch. HS-440)



IF = 455 KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BA6	4.3Meg	0Ω	25Ω	38Ω	†1.8KΩ	†1.1KΩ	100Ω
V 2	12BE6	22KΩ	.1Ω	25Ω	12Ω	†1.1KΩ	†1.1KΩ	4.4Meg
V 3	12BA6	4.3Meg	0Ω	38Ω	50Ω	†1.1KΩ	†1.1KΩ	100Ω
V 4	12AT6	10Meg	0Ω	0Ω	12Ω	1Meg	0Ω	†471KΩ
V 5	35C5	150Ω	470KΩ	50Ω	85Ω	470KΩ	†1.1KΩ	†450Ω
V 6	35W4	TP	TP	85Ω	117Ω	114Ω	114Ω	40KΩ

† MEASURED FROM PIN 7 OF V6.
TP - TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

PHOTOFACT* Folder

*TRADE MARK

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL 17-S-450

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PHOTOFACT* Folder
*TRADE MARK

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

RCA VICTOR MODEL 17-S-450 (Ch. KCS87X)

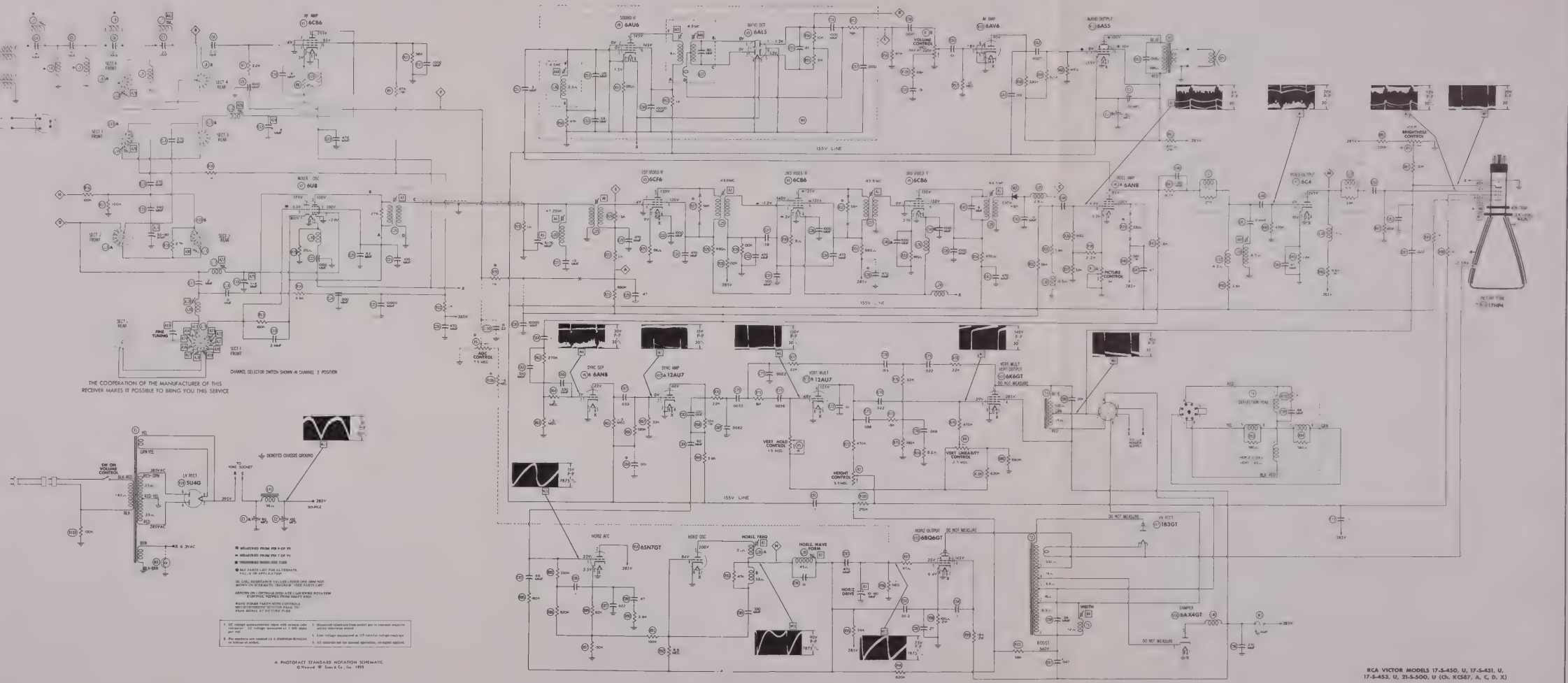
TRADE NAME	RCA Victor	MODELS	CHASSIS	TUNER
		17-S-450	KCS87 or KCS87X	KRK32
		17-S-451, 17-S-453	KCS87	KRK32
		17-S-450U, 17-S-451U, 17-S-453U	KCS87A	KRK30A
		21-S-500	KCS87C	KRK32
		21-S-500U	KCS87D	KRK30
MANUFACTURER	Radio Corp. of America, RCA Victor-Television Div., Camden 2, N.J.			
TYPE SET	Television Receiver			
TUBES	Nineteen			
POWER SUPPLY	110-120 Volts AC-60 Cycles		RATING 1.35 Amp. @ 117 Volts	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)			

INDEX

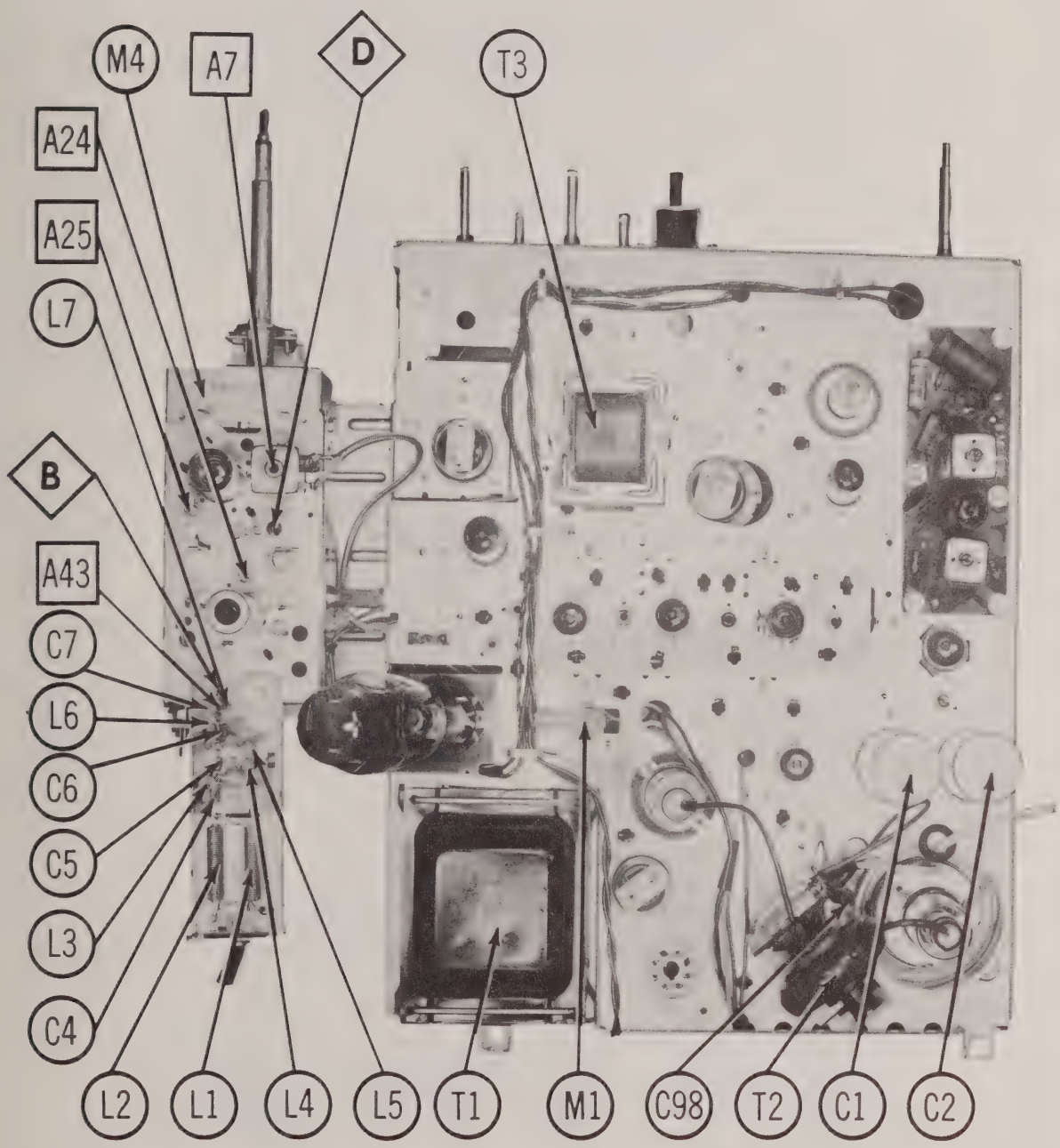
Alignment Instructions ..... 5 thru 9
Disassembly Instructions 22
Horizontal Sweep Circuit Adjustments 13
Parts List and Descriptions ..... 15 thru 18
Photographs
Cabinet-Rear View 13
Capacitor Identification 14, 19
Chassis-Top View 3
RF Tuner 4
Resistor Identification 23, 24
Sound IF Sub-Chassis 18
Photographs (Cont)
Trans., Inductor & Alignment Identification 21
Resistance Measurements 11
Servicing in the Field 22
Schematic (Alternate Tuner) 20
Schematic (TV) 2
Trouble Shooting Aids 12, 21
Tube Failure Check Chart 10
Tube Placement Chart (Bottom View) 11
Tube Placement Chart (Top View) 10

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

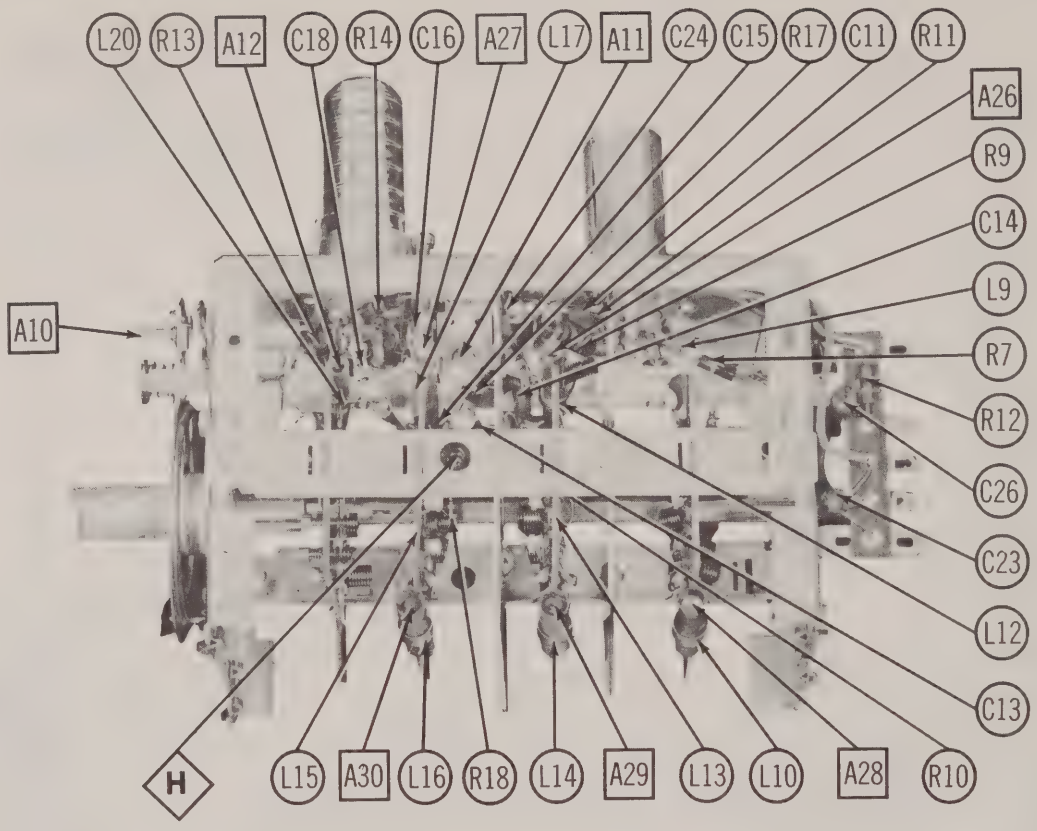

RF AMP
6CB6
MIXER OSC
6U8
SECT 1 FRONT
SECT 1 REAR
SECT 2 FRONT
SECT 2 REAR
SECT 3 FRONT
SECT 3 REAR
SECT 4 FRONT
SECT 4 REAR
FINE TUNING
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION
THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
SOUND IF
6AU6
RATIO DET
6AL5
VOLUME CONTROL
155V LINE
1ST VIDEO IF
6CF6
43.0MC
2ND VIDEO IF
6CB6
45.5MC
3RD VIDEO IF
6CB6
44.1MC
DET AMP
6AN8
PICTURE CONTROL
A AMP
6AV6
AUDIO OUTPUT
6AS5
VOLUME CONTROL
VIDEO OUTPUT
6C4
BRIGHTNESS CONTROL
PICTURE TUBE
17HP4
SYNC SEP
6AN8
SYNC AMP
12AU7
VERT MULT
12AU7
VERT OUTPUT
6K6GT
DO NOT MEASURE
VERT HOLD CONTROL
VERT LINEARITY CONTROL
HEIGHT CONTROL
DEFLECTION YOKE
HORIZ AFC
6SN7GT
HORIZ OSC
HORIZ FREQ
HORIZ WAVE FORM
HORIZ DRIVE
HORIZ OUTPUT
6BQ6GT
HV RECT
1B3GT
WIDTH
BOOST
DAMPER
6AX4GT
SW ON VOLUME CONTROL
LV RECT
5U4G
285VAC
285V SOURCE
TO 300MC SOCKET
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
RCA VICTOR MODELS 17-S-450, U, 17-S-451, U,
17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

PROPERTY OF
L. F. BLANKENSHIP
3814 MEADE ST.
DENVER, COLORADO

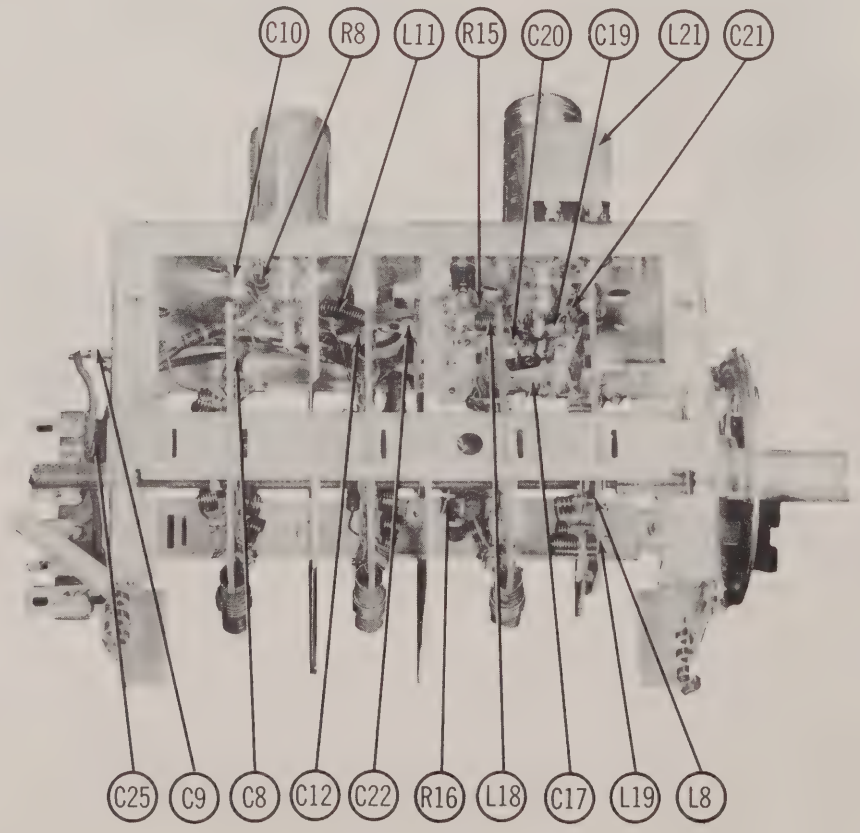


CHASSIS TOP VIEW

SET 277 FOLDER 10



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

M1 may be removed to prevent shock hazard during alignment. If not removed the high voltage lead should be taped securely away from the chassis.

VIDEO IF ALIGNMENT WITH KRK32 TUNER

Turn the AGC control to its fully clockwise position.
Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain.
Connect the negative terminal arm to point Ⓐ.
Set potentiometer arm to obtain -4 volts at point Ⓐ. Positive terminal to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD Ceramic capacitor	High side to point Ⓓ. Low side to chassis.	Not used.	44.5MC	Any unused channel.	Use VTVM DC probe to point Ⓒ. Common to chassis.	A1	Attenuate generator output to maintain not more than -3 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Increase generator output to maintain -3 volts on VTVM. Adjust for MINIMUM deflection. Core of coil should be nearest to chassis when properly adjusted.
5.	"	High side to point Ⓓ. Low side to tuner chassis.	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. amp. of scope thru detector probe (Fig. 1) to pin 5 of 6CF6 (V3). Low side to chassis.	A5, A6, A7	Adjust bias to read -4 volts at point Ⓐ. Clip a carbon 330Ω resistor from pin 1 of V5 to chassis. Connect a 180Ω carbon resistor from plate to screen of V3. Preset A5 to minimum capacity. If a separate signal generator is used for marker, couple it loosely to detector as in Fig. 1. Attenuate output of sweep generator to give 3 to 5 volts peak to peak on scope. Adjust A6 and A7 for maximum gain with 45.75MC at 75% of maximum response as in Fig. 2. Adjust A5 to place 42.5MC marker at 70% response on curve as in Fig. 2.
6.	"	High side to point Ⓔ. Low side to chassis.	"	42.5MC 45.0MC 45.75MC	"	Vert. amp. to point Ⓒ. Low side to chassis.	A1, A2, A3	Disconnect the 180Ω and 330Ω resistors. Retouch A1, A2 and A3, if necessary, to obtain response curve similar to Fig. 3. Attenuate output of generator to obtain 3 to 5 volts peak to peak on oscilloscope.
7.	"	"	"	41.25MC	"	"	A1, A3	Increase sweep output ten times and notice attenuation at 41.25MC. Adjust A1 and A3 to set 41.25MC marker at approximately 30 times down with response curve as shown in Fig. 3.
8.	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	"	42.5MC	All separately	"	A1, A2	Connect negative lead of 3 volt bias to point Ⓕ. Positive lead to chassis. SLIGHTLY readjust A1 and A2 to correct any overall tilt while switching from channel to channel as in Fig. 3.

VIDEO IF ALIGNMENT WITH KRK30A TUNER

Turn AGC control to its fully clockwise position. Connect the bias supply as under KRK32 Video IF Alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.0015MFD Ceramic capacitor	High side to point Ⓓ. Low side to chassis.	Not used	44.5MC	Not used locally	Use VTVM DC probe to point Ⓒ. Common to chassis.	A1	Attenuate generator output to maintain not more than -3 volts on VTVM. Adjust for maximum deflection.
2.	"	"	"	45.5MC	"	"	A2	"
3.	"	"	"	43.0MC	"	"	A3	"
4.	"	"	"	47.25MC	"	"	A4	Increase generator output to maintain -3 volts on VTVM. Adjust for minimum deflection. Core of coil should be nearest to chassis when properly adjusted.
5.	"	High side to point Ⓓ. Low side to tuner chassis.	44MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. of scope thru detector probe (Fig. 1) to pin 5 of 3CF6 (V3). Low side to chassis.	A5, A6, A7	Adjust bias to read -4 volts at point Ⓐ Clip a carbon 330Ω resistor from pin 1 of V5 to chassis. Connect a 180Ω carbon resistor from plate to screen of V3. Preset A5 to minimum capacity. If a separate signal generator is used for marker couple it loosely to detector (Fig. 1). Attenuate output of sweep generator to give 3 to 5 volts peak to peak on scope. Adjust A6 and A7 for maximum gain with 45.75MC at 75% of maximum response as in Fig. 2. Adjust A5 to place 42.5MC marker at 70% response on curve (Fig. 2).
6.	"	High side to point Ⓔ. Low side to chassis.	"	42.5MC 45.0MC 45.75MC	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A1, A2, A3	Disconnect the 180Ω and the 330Ω resistors. Retouch A1, A2 and A3 if necessary to obtain response curve similar to Fig. 3. Attenuate output of generator to obtain 3 to 5 volts peak to peak on oscilloscope.
7.	"	"	"	41.25MC		"	A1, A3	Increase sweep output ten times and notice attenuation at 41.25MC. Adjust A1 and A3 to set 41.25MC marker at approximately 30 times down with response curve as shown in Fig. 3.
8.	Two 130Ω Carbon Resistors	Across VHF antenna terminals with 130Ω in each lead.	"	42.5MC	All VHF channels separately	"	A1, A2	Connect negative lead of 3 volt bias to point Ⓕ. Positive to chassis. SLIGHTLY readjust A1 and A2 to correct any overall tilt while switching from VHF channel to VHF channel (Fig. 3).

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

PROPERTY OF
BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

VIDEO IF ALIGNMENT WITH KRK30A TUNER (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	300Ω Carbon Resistor in series with .0015MFD ceramic capacitor	High side to front terminal of 1N82 crystal holder. Low side to tuner case. Use very short leads.	797MC (30MC Swp)	45.75MC 42.5MC	Between Channels 88 & 89	Vert Amp thru detector (Fig.1) to junction of 180Ω and .0015MFD. (See remarks). Low side to chassis.	A8, A9	Set tuner to UHF position. Connect 180Ω in series with .0015MFD ceramic capacitor between point Ⓓ and chassis with capacitor end connected to point Ⓓ. If VHF generator is used couple it loosely to detector (Fig. 1). Connect a second bias supply to point Ⓕ. Positive side to tuner case. Adjust for -4 volts. Attenuate sweep generator for 0.5 volts peak to peak on scope. Adjust A8 and A9 for maximum gain as in Fig. 4. Remove 180Ω resistor and .0015MFD capacitor from point Ⓓ and chassis. If necessary adjust A36 to place 45.75MC marker at peak of curve. Adjust A37 for minimum tilt on curve. (Fig.4).
10.	"	"	"	795.25MC 799.75MC 42.5MC 45.75MC	88	Vert. Amp. to point Ⓓ. Low side to chassis.		Adjust sweep generator output for 3 volts peak to peak on scope. If necessary, retouch A8 and A9 to obtain response similar to Fig. 4. The markers should not fall below 90% on response curve. (Fig.4).
11.	Two 130Ω Carbon Resistors	Across antenna (VHF) terminals with 130Ω in each lead.	44MC (30MC Swp)	42.5MC 45.0MC 45.75MC 46.5MC	Check all VHF channels	"	A1, A2	Couple marker generator loosely to first video IF amplifier grid. Check for response curve similar to Fig. 5 on all VHF channels. SLIGHTLY retouch A1 and A2 if necessary to correct for any overall tilt as in step 8.

KRK30A ANTENNA MATCHING UNIT

The antenna matching unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. The FM trap which is located on the antenna matching unit may be adjusted without affecting the RF Alignment.

KRK32 TUNER ALIGNMENT

An RF unit which is operative and requires only minor touch-up adjustments will require no presetting of adjustment.
This unit is properly aligned at the factory and under normal use should not require alignment unless components are changed to effect alignment.
When complete alignment is necessary make the following pre-adjustments.
1. Preset A10 all the way out.
2. Set channel 7 thru 13 oscillator slugs on turn from tight.
3. Adjust A7 slug all the way out.
4. Disconnect the link from terminals "A" and "B" of L21 and terminate the link with a 390 carbon resistor.

Tuner alignment as outlined below requires the use of a heterodyne frequency meter. The limit of oscillator injection voltage are 2 volts minimum and 5.5 volt maximum measured at point Ⓓ with a VTVM.
Connect the synchronised sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect potentiometer arm of one of the bias supplies to point Ⓕ. Positive side to tuner chassis. Adjust for -3.5 volts bias at point Ⓕ.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.		RF Input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A11. Be careful the wire does not touch any of the tuned circuits as this may cause oscillator shift.	Not used.	Set freq. meter to 257MC	8	Not used.	A10	Turn fine tuning control to its mid-range position. Adjust A10 for audible beat on frequency meter.
13.	If channel 8 oscillator frequency cannot be reached by adjustment of A10, switch to channel 13 and adjust A12 for channel 13 oscillator frequency. Switch to channel 12 and adjust A13 for channel 12 oscillator frequency. Continue to channel 8. Adjust proper oscillator trimmer to obtain oscillator frequency on each channel. Also, on channel 8 adjust A10 for channel 8 oscillator frequency. Switch to channel 13 and adjust A12, then switch back to channel 8 and adjust A10 again.							
14.	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point Ⓐ. Low side to chassis.	A34, A11, A35	Set scope to maximum gain for useable indication on scope. Adjust A34, A11 and A35 for response curve similar to Fig. 6. A34 affects bandpass. A35 affects the tilt. A11 affects the overall response bandwidth.
15.		Connect frequency meter as in step 12.	Not used.	Freq. meter to 257MC	13	Not used.	A12	Turn fine tuning control to mid-range position. Adjust A12 for audible beat. Turn A12 an additional turn in the same direction and readjust A10 to again obtain an audible beat.
16.	Two 300Ω carbon resistors	Across antenna terminals with 300Ω in each lead.	213MC (30MC Swp)	211.25MC 215.75MC	"	"	A36, A27	Adjust for proper response as shown in Fig. 4.
17.	Connect the DC probe of a VTVM to point Ⓓ. Common to chassis. Check oscillator injection voltage. Check oscillator tracking on channels 8 thru 13. If voltage is not within limits. Check V2 by replacing. If voltage is still off, replace C17. If either is replaced, repeat oscillator tracking procedure for channels 8 thru 13.							
18.		Connect frequency meter as in step 12.	Not used.	Freq. meter to 257MC	8	Not used.	A10	Check for audible beat on frequency meter. If necessary, adjust A10 for proper frequency.
19.	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	"	Vert. amp. to point Ⓐ. Low side to chassis.	A24, A11, A35	If necessary, retouch A24, A11 and A25 to obtain response as in Fig. 4. If A25 required adjustment, turn off generator and switch back to channel 13 and check oscillator injection voltage as in step 17. If necessary, repeat steps 16, 17 and 18 until proper response is obtained.
20.		Connect frequency meter as in step 12.	Not used.	Freq. meter to 129MC	6	Not used.	A19	Set fine tuning control to its mid-range position. Adjust A19 for audible beat on frequency meter.

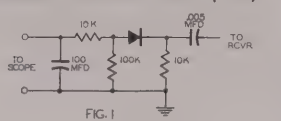


FIG. 1

FIG. 2

FIG. 3

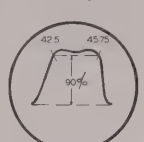


FIG. 4

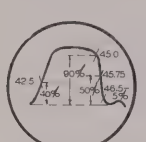


FIG. 5

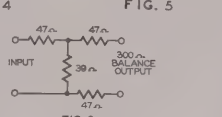


FIG. 6

FIG. 7

FIG. 8

FIG. 9

KRK32 ALIGNMENT (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
21.	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	85MC (30MC Swp)	83.25MC 87.75MC	"	Vert. amp. to point Ⓓ. Low side to chassis.	A26, A35, A30	Adjust for response curve similar to Fig. 7. Check oscillator injection as in step 17. A26 affects maximum amplitude of curve midway between markers. A29 affects frequency bandpass. A30 affects tilt.
22.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"		Check for response similar to Fig. 7. Check oscillator injection voltages for each channel at point Ⓓ. If markers fall below 80% on any one channel, retouch A26, A29 and A30 to obtain response curves within proper limits.
			89MC (30MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
23.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (30MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
24.		Connect frequency meter as in step 12.	Not used.	Freq. meter to 257MC	13	Not used	A12	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection on each channel at point Ⓓ, to verify that the voltages are within 2 volts MINIMUM and 5.5 volts maximum.
				251MC	12		A13	
				245MC	11		A14	
				239MC	10		A15	
				233MC	9		A16	
				227MC	8		A17	
				221MC	7		A18	
				129MC	6		A19	
				123MC	5		A20	
				113MC	4		A21	
				107MC	3		A22	
				101MC	2		A23	

KRK30A TUNER UNIT ALIGNMENT

An RF unit which is operative and requires only minor touch-up adjustments will require no presetting of adjustments.
When complete alignment is necessary make the following pre-adjustments.
1. Preset A10 all the way out.
2. Set channel 7 to 13 oscillator slugs one turn from tight.
3. Adjust A7 slug all the way out. Disconnect the link from terminal A and B of the input IF transformer, and terminate the link with a 390 carbon resistor.

Tuner alignment as outlined below requires the use of a heterodyne frequency meter. The limit of oscillator injection voltage are 2 volts minimum and 5.5 volts maximum measured at point Ⓓ with VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect potentiometer arm of one of the bias supplies to point Ⓕ. Positive side to tuner chassis. Adjust for -3.5 volts bias at point Ⓕ.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
25.	Direct	High side to point Ⓑ. Low side to chassis.	Not used	43.5MC (400-Adod)	2	Vert. Amp to point Ⓐ. Low side to chassis.	A31	Short out AGC at point Ⓒ. Adjust scope for maximum gain. Adjust A31 for MINIMUM output at 400% indication on scope. If necessary A31 may be adjusted in the field to provide additional rejection of a specific frequency. Exercise care so that A31 is not tuned into channel 2 reducing that channel's sensitivity. Remove short from tuner AGC at point Ⓒ.
26.		RF Input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A11.	"	Set Freq. meter to 257MC	8	Not used	A35, A32, A10	Preset A35 to read -3 volts at point Ⓕ. Turn fine tuning control fully clockwise. Adjust bias to read -4 volts at point Ⓕ. Adjust A33 for audible beat on frequency meter. Adjust A10 clockwise until beat note just begins to change, then turn one full turn in same direction. Return fine tuning control to its mid-range position.
27.	NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A32 switch to channel 13 and adjust A13 for channel 13 oscillator frequency. Then switch back to channel 12 and adjust A13 for channel 12 oscillator frequency. Continue to channel 8 adjust proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8 adjust A32 for channel 8 oscillator frequency. Switch back to channel 13 and readjust A12, then switch back to channel 8 and adjust A32 again.							
28.	Two 150Ω Carbon Resistors	Across antenna terminals with 150Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point Ⓐ. Low side to chassis.	A33, A11, A24, A34	Adjust A7 slug fully counter clockwise. Couple signal generator loosely to antenna terminals. Adjust for response similar to Fig. 4. A34 affects maximum amplitude of curve midway between two markers. A24 affects frequency bandpass. A33 affects curve tilt. (Assuming A34 is properly adjusted). A11 affects the response band width.
29.	Connect probe of a DC VTVM to point Ⓓ. Adjust A35 for -3 volts at point Ⓕ. If necessary readjust A10, A33, A11, A24 for proper response. Readjust A34 for maximum gain at mid-point of curve.							

RCA VICTOR MODELS 17-S-450, U, 17-S-451, U, 17-S-453, U, 21-S-500, U (Ch. KCS87, A, C, D, X)

ALIGNMENT INSTRUCTIONS (cont)

KRK30A TUNER ALIGNMENT (CONT.)

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
30.		Connect frequency meter as in step 12.	Not used	Freq. meter to 257MC	13	Not used	A12	Rotate fine tuning control maximum clockwise. Adjust A12 for maximum audible beat on frequency meter. SLIGHTLY overshoot A12 an additional turn in the same direction, then readjust A10 again to obtain an audible beat.
31.	Two 300Ω Carbon Resistors	Across antenna terminals with 300Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point Ⓗ. Low side to chassis.	A27, A26	Adjust for response similar to Fig. 4. Turn off alignment generator and check oscillator injection voltage at point Ⓗ. (Using VTVM). If A35 required readjustment turn sweep generator back on and recheck channel 13 response curve. If necessary readjust A26 and A27 for desired response.
32.		Connect freq. meter in step 12.	Not used	Freq. meter to 227MC	8	Not used	A10	Check for audible beat on frequency meter. If necessary readjust A10 for proper oscillator frequency.
33.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	"	Vert. Amp. to point Ⓗ. Low side to chassis.	A33, A11, A24, A34	If necessary retouch A33, A11, A24 and A34 to obtain response similar to Fig. 4. If A33 required adjustment turn off generator and check oscillator injection voltage on channel 13 at point Ⓗ. with VTVM. If necessary repeat adjustment of A11, A24, and A34 until proper response is obtained.
34.		Connect freq. meter as in step 12.	Not used	Freq. meter to 129MC	6	Not used	A19	Set fine tuning control to its mid-range position. Adjust A19 for audible beat on frequency meter.
35.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	"	Vert. Amp. to point Ⓗ. Low side to chassis.	A28, A29, A30	Adjust for freq. response similar to Fig. 4. Check oscillator injection voltage as in step 29. Readjust A13 if necessary. If A35 requires adjustment switch back to channel 8. Readjust A33 for correct curve shape and A10 and A32 for correct oscillator freq.
36.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	"	"		Check for response curve similar to Fig. 7. Check oscillator injection voltage for each channel at point Ⓗ. If markers fall below 80% on any one channel retouch A29 and A30 to obtain proper response curves within limits.
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
37.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check response curve similar to Fig. 7. Check oscillator injection voltage for each channel at point Ⓗ. If markers fall below 80% on any one channel retouch A24, A33 or A-11 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
38.		Connect freq. meter as in step 12.	Not used	Freq. meter to 257MC	13	Not used	A12	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point Ⓗ. To verify that the voltage is within 2 volts MINIMUM and 5.5 volts MAXIMUM.
				251MC	12		A13	
				245MC	11		A14	
				239MC	10		A15	
				233MC	9		A16	
				227MC	8		A17	
				221MC	7		A18	
				129MC	6		A19	
				123MC	5		A20	
				113MC	4		A21	
				107MC	3		A22	
				101MC	2		A23	

RTY OF
NKENSHIP
MEADE ST.
VER, COLORADO

ALIGNMENT INSTRUCTIONS (cont)

KRK30A UHF TUNER ALIGNMENT

Turn the change-over switch to UHF position. The IF transformer adjustment (A9) should be grounded by inserting a clip lead thru the aperture provided in top of tuner. Connect the other lead end to tuner case.
To make the RF adjustment on UHF tuner, the UHF unit will have to be removed from set. IF and oscillator adjustments may be aligned without removing UHF tuner.
It will be necessary to fabricate a test dial to fit over the split gear on the tuner shaft for accurate alignment.
Reference marks at 0, 5 and 164 degrees should be scribed on the test dial. Locate "0" degree reference point by placing a 1/16" shim between the stop pin on the tuner and the stop plate on the gear assembly with the capacitor plates fully meshed.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
39.	300Ω pad. (Fig. 6)	Across UHF antenna terminals thru 300Ω pad. (Fig. 6)	887.5MC (20MC Swp)	887.5MC 41.25MC 43.5MC 45.75MC	83 (Rotate tuning dial to 164°)	Vert. amp. to point (I) Low side to chassis.	A38, A39, A40	Connect the high sides of the VHF generator thru 1000Ω carbon resistor to rear terminals of 1N82. Crystal holder and insert markers for 41.25MC, 43.5MC and 45.75MC. Adjust for response similar to Fig. 8. Adjust A38 and A39 for maximum amplitude over coupled response curve centered at 887.5MC. Adjust A40 until the 43.5MC marker coincides with the 887.5MC.
40.	"	"	473.5MC (20MC Swp)	473.5MC 41.25MC 43.5MC 45.75MC	14 (Rotate tuning dial to 5°)		A41, A42	Adjust A41 until 43.5MC marker coincides with 473.5MC marker and with the 41.25MC and 45.75MC markers as shown in Fig. 9. Adjust A42 to bring the oscillator trimmer (A40) within range.

41. If necessary, repeat steps 39 and 40 until response curves are obtained. With perfect tracking the three markers will ride on top of the response curve. They may ride down the curve as far as 70% without affecting seriously the alignment. If they fall below the 70% level, knifing of the RF plates is necessary to correct tracking. Two holes are provided on the left side of the tuner thru which the plates may be knifed. They also may be knifed with the shield cover removed. Always knife the plates while tuning in the lower frequency. To avoid affecting the tracking above the point of knifing, a check of which section to knife may be made by touching the plates with the knifing tool while observing the response.

42. Connect the DC probe of a VTVM to point (I). Common to chassis. Set VTVM to 1.5 volt DC scale. Tune over entire UHF range. Readings between .05 volts and .4 volts should be obtained. Voltages outside these limits are an indication of low B+ voltage, low or high crystal impedance or an oscillator tube operating outside its allowable limits. Recalibrate high and low frequency bands if oscillator tube is changed. Connect the DC probe to point (J) which is tuner bias terminal. Common to chassis. VTVM should read between .5 volts and 2.5 volts. Readings outside of these limits will cause crystal currents outside allowable limits.

FM TRAP ADJUSTMENT

43. Tune in a local TV station in which interference is noticed. Adjust A43 for minimum interference in the picture.

SOUND IF ALIGNMENT

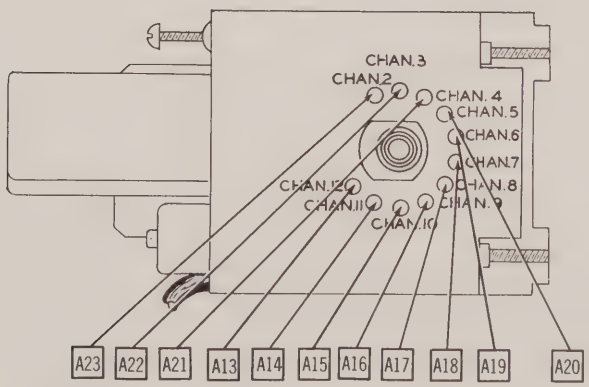
Ground pin 1 of V5.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
44.	.001MFD	High side to point (C). Low side to chassis.	4.5MC (Unmod)	Any not used locally	DC probe to point (K). Common to chassis.	A46	Adjust for maximum deflection. Peak with core at chassis end.
45.	"	"	"	"	"	A44, A45	Adjust for maximum deflection.
46.	"	"	"	"	DC probe to point (L). Common to chassis.	A46	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Tune in a station with good audio and notice if buzz is present. If noticed readjust A46 for MINIMUM buzz and clearest sound.

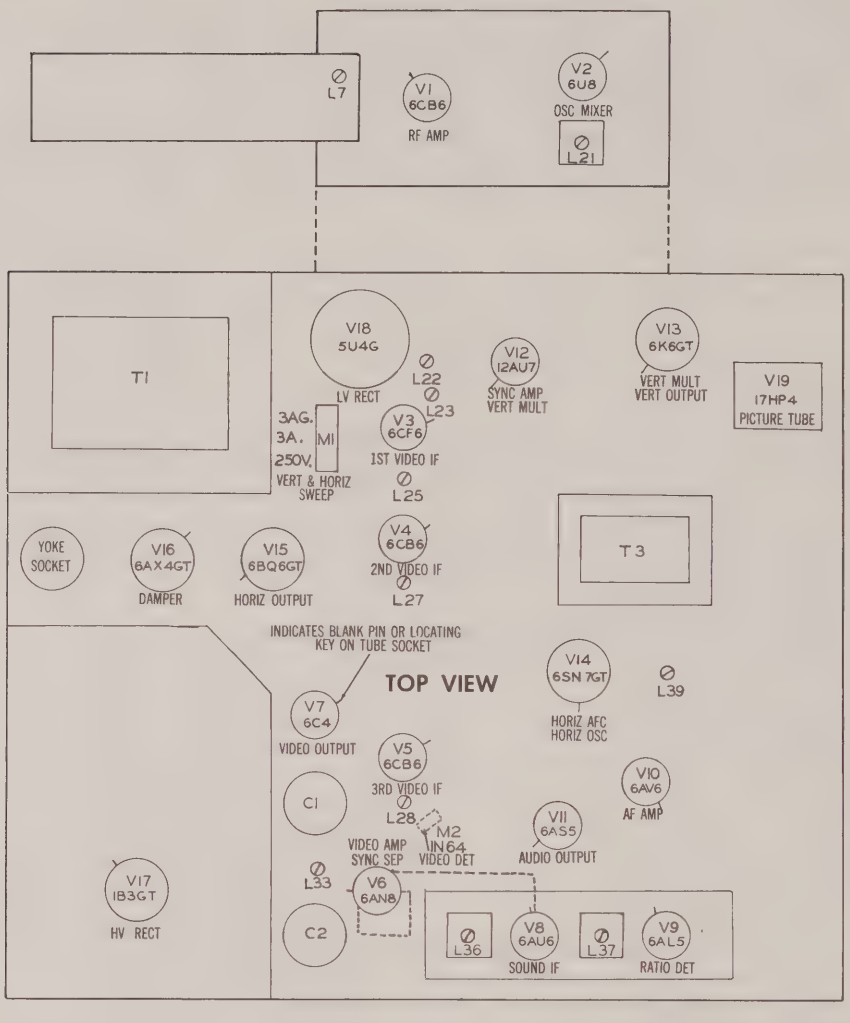
4.5MC TRAP ADJUSTMENT

Ground pin 1 of V5.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
47.	.001MFD	High side to point (C). Low side to chassis.	4.5MC (Unmod)	Any not used locally	DC probe thru detector (Fig. 1). to point (M) Common to chassis.	A47	Increase signal generator output for .5 volts on VTVM. Adjust for MINIMUM deflection. Remove ground from pin 1 of V5.



TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V18**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V11**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V19**
Has pic, no sound - **V8, V9, V10, V11**

SYNC FAILURE
No vert. sync - **V12, V13**
No horiz. sync - **V12, V14**
No vert. or horiz. sync - **V6, V12**

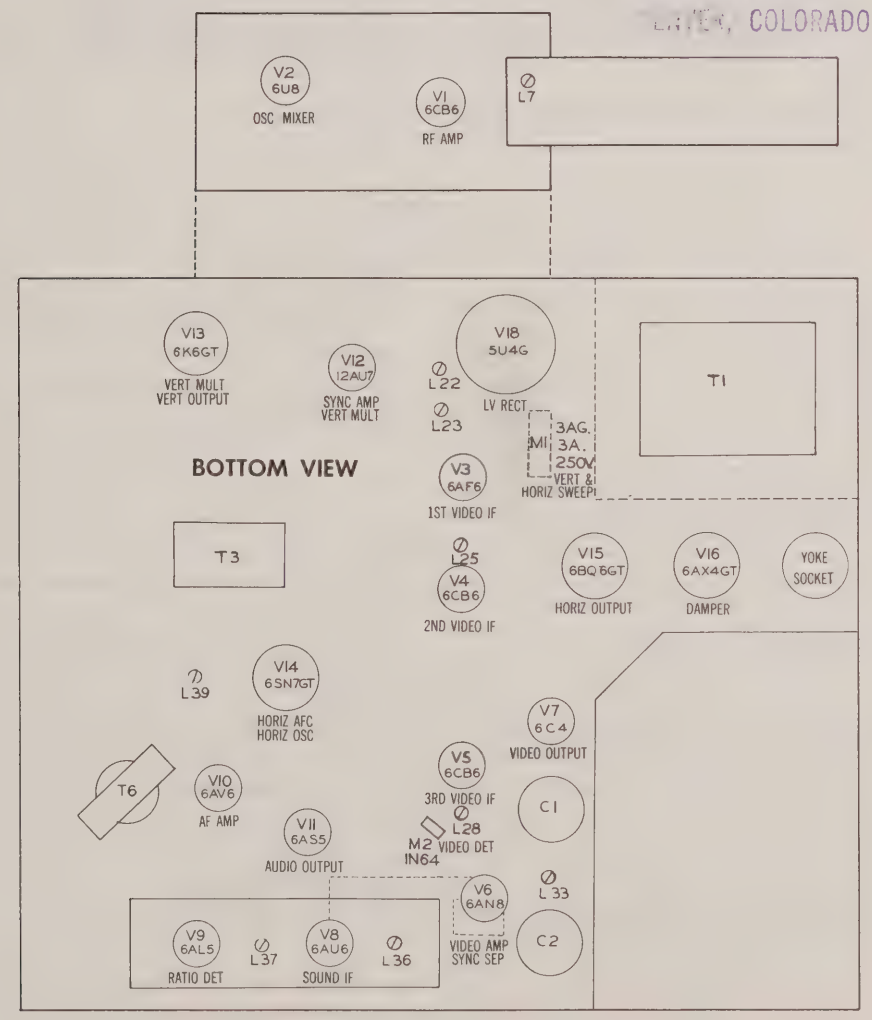
SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V19, Fuse (M1)**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, V18**
Vert. off freq. - **V12, V13**
Horiz. off freq. - **V12, V14**

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	750KΩ	47Ω	0Ω	.1Ω	†2KΩ	†35KΩ	0Ω		
V 2	6U8	†6.7KΩ	100KΩ	INF	0Ω	.1Ω	INF	0Ω	INF	INF
V 3	6CF6	730KΩ	68Ω	0Ω	.1Ω	■680Ω	■680Ω	0Ω		
V 4	6CB6	90KΩ	■18Ω	0Ω	.1Ω	†700Ω	†700Ω	INF		
V 5	6CB6	.2Ω	180Ω	0Ω	.1Ω	▲500Ω	▲500Ω	0Ω		
V 6	6AN8	▲1.5Meg	3Meg	0Ω	0Ω	.1Ω	▲9KΩ	†56KΩ	1Meg	500Ω
V 7	6C4	†6.8KΩ	INF	0Ω	.1Ω	†6.8KΩ	470KΩ	1.8KΩ		
V 8	6AU6	47KΩ	0Ω	0Ω	.1Ω	▲1KΩ	▲1KΩ	120Ω		
V 9	6AL5	90KΩ	90KΩ	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 10	6AV6	10Meg	0Ω	.1Ω	0Ω	0Ω	0Ω	†340KΩ		
V 11	6AS5	150KΩ	500KΩ	.1Ω	0Ω	500KΩ	†500Ω	†900Ω		
V 12	12AU7	▲14KΩ	33KΩ	0Ω	.1Ω	.1Ω	▲3Meg	1.6Meg	0Ω	0Ω
V 13	6K6GT	INF	0Ω	†600Ω	†40Ω	1.8Meg	INF	.1Ω	0Ω	
V 14	6SN7GT	1.3Meg	†40Ω	230KΩ	250KΩ	†40KΩ	0Ω	.1Ω	0Ω	
V 15	6BQ6GT	INF	.1Ω	100Ω	†18KΩ	1Meg	1Meg	0Ω	100Ω	Top Cap ▲18Ω
V 16	6AX4GT	INF	INF	950KΩ	INF	†40Ω	INF	.1Ω	0Ω	
V 17	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲355Ω
V 18	5U4G	INF	30KΩ	INF	25Ω	INF	23Ω	INF	30KΩ	
V 19	17HP4	0Ω	470KΩ	Pin 6 ▲1KΩ	Pin 10 ▲330KΩ	Pin 11 †240KΩ	Pin 12 .1Ω			

† MEASURED FROM PIN 2 OF V18.
■ MEASURED FROM PIN 7 OF V4.
▲ MEASURED FROM 155V LINE.
▲ MEASURED FROM PIN 3 OF V16.

PERTY OF
BLANKENSHIP
24 MEADE ST.
[illegible], COLORADO



TUBE PLACEMENT CHART

SET 277 FOLDER 10

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V18. Check adjustments B3 and B4. Check T2, T4A, C93, R99 and other associated components.

DRIVE LINES

Check by substitution V15 and V16. Check adjustment B3. Check T2, R99, R95, C90, C93 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V14, V15 and V16. Check C87, C88, R90 for open. Check L38, R93, C89 and other associated components.

XMAS TREE EFFECT

Check by substitution V14, V15 and V16. Check T2 and T4 for internal arcing. Check L38, L39, C90, C85, C93, R91, R87 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C80 and other associated components.	Check C71, C72, C74, R80, R72, R100, R2 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check height and vertical linearity controls for proper operation. Check T3, R100, R72 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R100, R72, R2, C72 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check R80, R79, R4, R104, C74, T3 and other associated components.

FOLDS

Check by substitution V12 and V13. Check C72, C74, R80, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6 and V12. Check C64, C65, C67, R65, R68, R69 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check C70, C71, R5 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V14. Check C84, C89, C90, R93, R95, R92, L38 and other associated components.

HORIZONTAL BENDING

Check by substitution V6, V12 and V14. Check components associated with V14.

VIDEO

LOSS OF VIDEO

Check by substitution V6 and V7. Check R40, R42, R46, R41, C44, C48, C50, L32 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A47. Check video IF alignment.

POOR CONTRAST

Check by substitution V6 and V7. Check video crystal detector network. Check C44, C48, C50, L31, L35, R45 and other associated components.

NEGATIVE PICTURE

Check by substitution V6 and V7. Check picture tube. Check C44, C48, C50, L30, R40, R43 and other associated components.

SMEAR

Check by substitution V6 and V7. Check L29, L30, L31, L35, C44, C48, C50 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages V10 and V11 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C58, C60, C62, C63, C3, R58, R59, R61, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A46 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

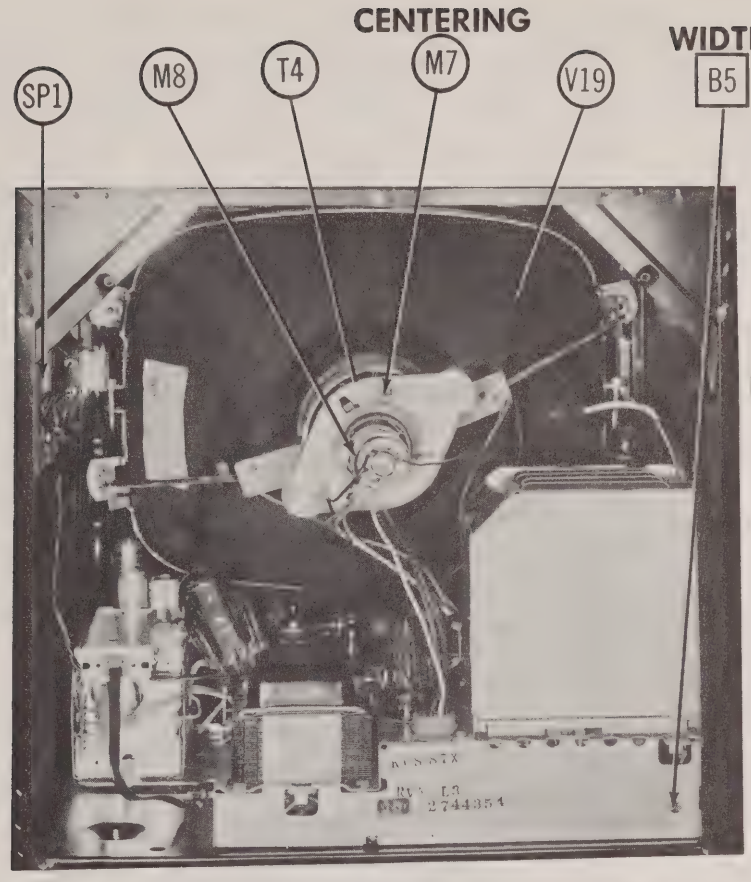
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V18. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V18. Check B+ filter and decoupling network.



PROPERTY OF
L. F. BLANKENSHIP
[illegible] MEADE ST.
[illegible]

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern. If the picture cannot be synchronized horizontally adjust horizontal frequency slug (B1) until picture synchronizes.

If picture still will not synchronize adjust the horizontal waveform slug (B2) several turns out of the coil and readjust B1 to synchronize the picture.

If picture width or linearity is incorrect adjust the horizontal drive (B3) the width slug (B4) for proper results.

HORIZONTAL WAVEFORM ADJUSTMENT

The horizontal waveform adjustment is adjusted at the factory and normally will require no readjustment. If B1 or B2 coils are replaced in set, scope adjustment will be necessary to synchronize the picture. Short out slug (B2) with clip leads, and turn B1 slug all the way out. Rotate B1 slug back in until picture locks in sync. Remove short from B2. Connect the low capacity probe of an oscilloscope to terminal point ⑭ . on schematic. Low side to chassis. Adjust B2 until the waveform on scope appear similar to Fig. 10.

AGC CONTROL ADJUSTMENT

Connect the vertical amplifier of an oscilloscope to pin 6 of V7. Connect the low side to chassis. Turn AGC control fully counter clockwise. Tune in a strong TV station and adjust scope to see video waveform.

Turn AGC control clockwise until sync tips begin to become compressed, then back just enough to remove compression.

If the control is set too far clockwise on a weak signal it may overload when receiving a strong signal.

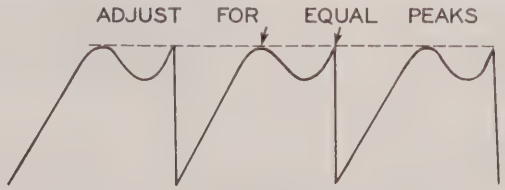
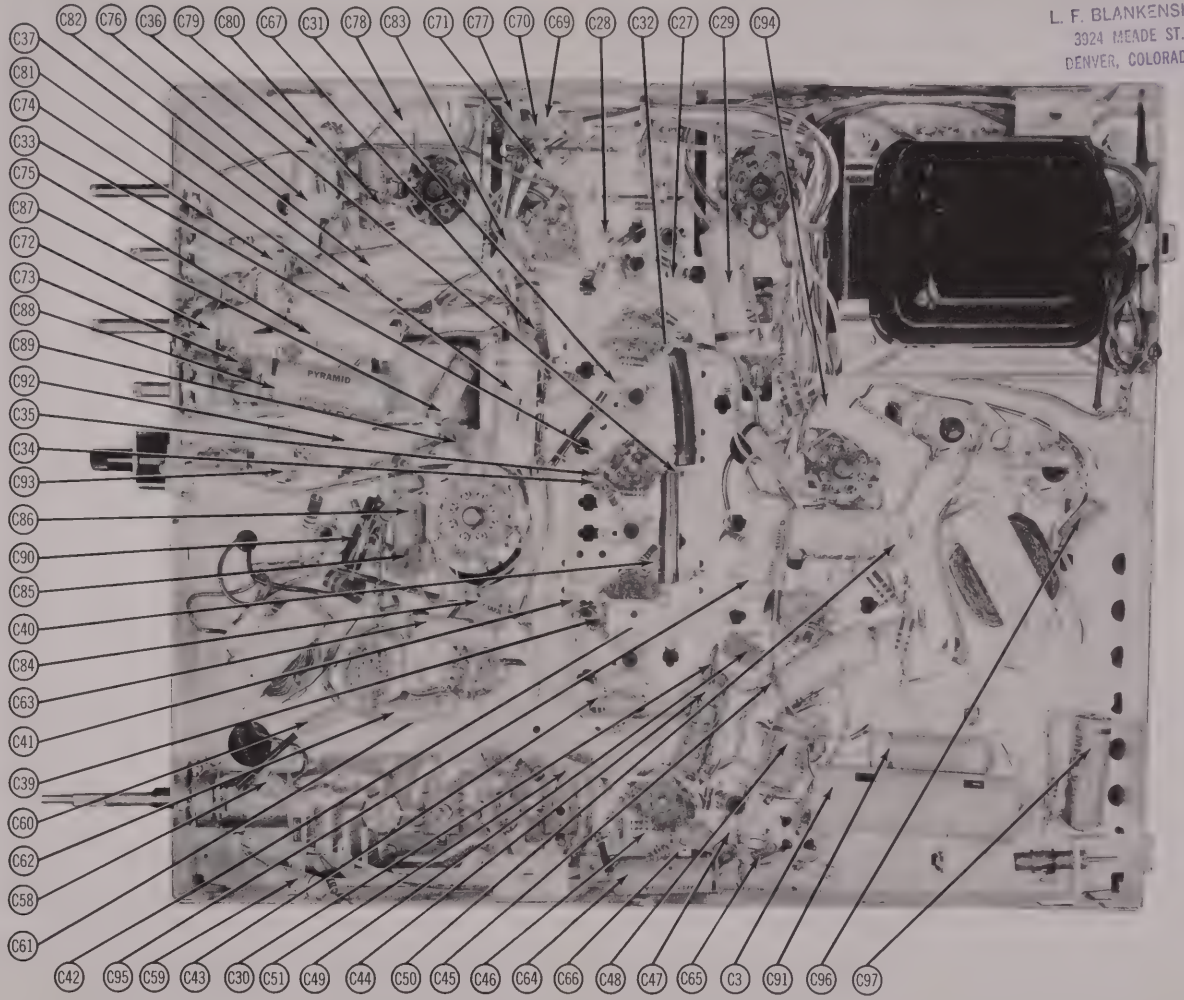


FIG. 10

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6CB6	6CB6	7CM	
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st Video IF Amp.	6CF6	6CF6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Amp-Sync Sep.	6AN8	6AN8	9DA	
V7	Video Output	6C4	6C4	6BG	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp.	6AV6	6AV6	7BT	
V11	Audio Output	6AS5	6AS5	7CV	
V12	Sync Amp. - Vert. Mult.	12AU7	12AU7	9A	
V13	Vert. Mult. - Vert. Output	6K6GT	6K6GT	7S	
V14	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	RCA Victor PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	17HP4	17HP4/17RP4	17HP4/17RP4	17HP4/17RP4	17HP4/17RP4	12L	① Aluminized
	21YP4	21YP4 21YP4A ①	21YP4 21YP4A ①	21YP4 21YP4A ①	21YP4 21YP4A ①	12L 12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲80	400	79147			FP229.3	TM-D80-450	D-344	
B	▲80	200							
C2	100	400	79700			FP150	TM-100-450	S-241	
C3	100	250	79314			FP129.1	TD-100-450	MT-25100	
C4	18			TCZ-18	NP0K-180				
C5	5			TCZ-5	NP0A-050	ZT-555			
C6	27			TCZ-27	NP0L-270				
C7	33			TCZ-33	NP0L-330	ZT-5433			
C8	270			D6-271	GP2K-271	UC-5327			
C9	1000			MFT-1000					
C10	18			TCZ-18	NP0K-180				
C11	1000			DD-102	801-001	DC-521			
C12	1-4			829-4		CT551			
C13	270			D6-271	GP2K-271	UC-5327			
C14	270			D6-271	GP2K-271	UC-5327			
C15	390			D6-391	GP2K-391	UC-5339			
C16	1-4			829-4		CT551			
C17	2								
C18	10			TCZ-10	NP0K-100	ZT-541			
C19	12			TCZ-12	NP0K-120				
C20	82			TCZ-82	NP0-337-820				
C21	100			D6-101	801-101	UC-531			
C22	1000			MFT-1000					
C23	470			D6-471	831-471	UC-5347			
C24	1000			MFT-1000					
C25	10000			DD-103	811-01	DC-511			
C26	470			D6-471	831-471	UC-5347			
C27	15		39044	TCN-15	N750K-150	NT-5415			
C28	470		77293	D6-471	831-471	UC-5347			
C29	.47	200	73787			PT4047			
C30	10000		73960	DD-103	811-01	DC-511			
C31	470		77293	D6-471	831-471	UC-5347			
C32	1000		77252	DD-102	801-001	DC-521			
C33	470		77293	D6-471	831-471	UC-5347			
C34	470		77293	D6-471	831-471	UC-5347			
C35	1000		77253	DD-102	801-001	DC-521			
C36	1000		77252	DD-102	801-001	DC-521			
C37	.39	200	79318						
C38	470		77293	D6-471	831-471	UC-5347			Note 1
C39	1000		78623	DD-102	801-001	DC-521			
C40A	1000		79319	DD2-102	812-001	DCD-521			
B	1000								
C41	470		77293	D6-471	831-471	UC-5347			
C42	8		79164						
C43	10		33098	TCN-10	N750K-100	NT-541		KR-1410	
C44	.1	200	73784	DF-104		PT401	IMP2-P1	330201	
C45	.47	200	73787			PT4047	IMP2-P47	3302047	
C46	120		71614	TCN-120	N750L-121			KR-1312	
C47	6								
C48	.1	600	79149	DF-104		PT601	IMP6-P1	330601	
C49	47	500	39620	D6-470	GP1K-470	MC225		K-1447	
C50	.1	600	73557	DF-104		PT601	IMP6-P1	330601	
C51	3		76507	TCN-3.3	N750A-3R3				
C52	39		79323		N330L-390				
C53	56		79234	TCN-56	N750K-560				
C54	10000		73960	DD-103	811-01	DC-511			
C55	.47	200	79148			PT4047	IMP2-P47	3302047	
C56	1000	500	39652	D6-102	GP2L-102	MC255	IMP6-D1	K-1210	
C57	.0033	400	79315	D6-332	GP2-333-332	PT6233	IMP6-D33	3306233	
C58	.0047	400	79017	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C59	.01	200	79316	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C60	.01	200	79014	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C61	.001	600	75643	D6-102	GP2L-102	PT621	IMP6-D1	330621	
C62	.0027	600	73599	D6-272	GP2-333-272	PT623	IMP6-D3	3306227	

PROPERTY OF
L. F. BLANKENSHIP

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA: RCA Victor PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C63	.0082	1000	78979	DD8-.82		CT8-D82			
C64	.1	400	73551	DF-104		PT401	IMP4-P1	330401	
C65	330	500	39640					KR-1333	
C66	330	500	39640					KR-1333	
C67	033	400	73552			PT4133	IMP6-S3	3306133	
C68	001	400	77252	D6-102	GP2L-102	PT501	IMP6-D1	330631	Note 1
C69	.0082	400	79018					3306282	
C70	.0033	400	79315	D6-322	GP3-332-S3	PT6233	IMP6-D33	3306233	
C71	.0039	600	78232	D6-402	GP3-332-402	PT634	IMP6-D4	3306239	
C72	.01	600	73594	D6-103	GP3-333-103	PT631	IMP6-S1	330631	
C73	.1	400	73551	DF-104		PT401	IMP4-P1	330401	
C74	.022	600	73798	DF-303	S17-S3	PT6223	IMP6-S23	3306223	
C75	.056	600	79317						
C76	.068	400	79018			PT4168	IMP4-P68	3304168	
C77	.0022	600	73595					CR-1222	
C78	.015	400	73797						
C79	.022	400	73798						
C80	001	1600	78980	DD8-102	1R5KV-102	PT1621	CT8-D1	2118-.001	
C81	.022	600	73798	DF-303	S17-S3	PT6123	IMP6-S23	3306122	
C82	.1	400	73551	DF-104		PT401	IMP4-P1	330401	
C83	220	500	58271	TC2-220	NP0-335-221	MC1240		KR-1322	
C84	82	1000	76474						
C85	68	500	76475	TC2-68	NP0-357-680			KR-1468	
C86	.1	400	73551	DF-104		PT401	IMP4-P1	330401	
C87	.022	400	73565	DF-303	S17-S3	PT4123	IMP4-S23	3304122	
C88	47	200	73787			PT4047	IMP2-P47	3302047	
C89	220	500	76476					KR-1333	
C90	01	600	73594						
C91	.1	600	73557	DF-104		PT601	IMP6-P1	330601	
C92	.0012	600	78995					CR-1212	
C93	470	1000	59607	DD30-471	1R5KV-471	MC1347		K-2347	
C94	.1	600	73557	DF-104		PT601	IMP6-P1	330601	
C95	.27	200	73786						
C96	270	1000	79023	DD16-271	1R5KV-271	MC1230		K-2327	
C97	.047	1000	73597			PT6547	CT6-S5	2120-.05	
C98	56	6000	79830	DD60-560				K-6456	
C99	68								
C100	22	200	78905			PT4023	IMP2-P22	3302022	Note 2

Note 1. Not used in some versions.
Note 2. Used only in Ch. KCS87A and KCS87D.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	300Ω	½	79699	*QJ-315	RTY-501	F1-18	UF33R	Picture - Panel
B	1Meg	½				R2-57	UR1CT254 ① †	Volume tapped at 225KΩ - Rear
C	Switch					KS-1	UB-26 ②	Attach to R1B
R2A	3.5Meg	½	76808	B1-143	A47-4Meg-S	AB-98	SU-89	Height
B	Shaft		Not Req.	TM-5KIT	KSS-3	Not Req.	Not Req.	Attach to R2A
R3A	200KΩ	½	79439	Q1i-129	A47-200K-S	AB-48	U-43	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R3A	200KΩ	½	76809	Q1i-129	A47-200K-S	B-48	U-43	Brightness - Note 1
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	2.5Meg	½	76807	B1-139	A47-2.5Meg-S	AB-83	SU-86	Vert. Linearity
B	Shaft		Not Req.	TM-5KIT	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1.5Meg	½	76810	Q1i-138	A47-1.5Meg-S	AB-75	U-116	Vert. Hold - Note 2
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6	7.5Meg	½						AGC - Note 3

Note 1: Used in chassis KCS87D and KCS87A only.
Note 2: Models 21-S-500 and 21-S-500U may use an alternate control part no. 78855.
Note 3: Used in VHF-UHF models only.
† Universal replacement (Mallory exact duplicate part no. UE-42SS)
* CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B1T-12 & P1-300 (PANEL) B1S-13TA & R1-216 (REAR) 78-1 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.	NOTES
R7	22KΩ	½	502222	BTS-22K	
R9	47Ω	½	502047	BTS-47	
R9	47KΩ	½	512347	BTA-47K	
R10	1000Ω	½	502310	BTS-1000	
R11	56KΩ	½	502356	BTS-56K	
R13	1000Ω	½	502210	BTS-1000	
R13	100KΩ	½	502410	BTS-100K	
R14	5600Ω	½	502356	BTS-5600	
R15	120Ω	½	502112	BTS-120	
R16	100KΩ	½	502410	BTS-100K	
R17	100KΩ	½	502410	BTS-100K	
R18	2700Ω	½	502227	BTS-2700	
R19	1000Ω	½	502310	BTS-1000	
R20	1000Ω	½		BTS-1000	Note 2
R21	5600Ω	½	30562	BTS-5600K	
R22	56KΩ	½	502356	BTS-56K	
R23	1000Ω	½	502210	BTS-1000	
R24	15KΩ	½	38714	BTS-15K	
R25	68Ω 5%	½	503068	BTS-68 5%	
R26	680Ω	½	504168	BTS-680	
R27	56KΩ 5%	½		BTS-56K 5%	Note 1
R28	150KΩ 5%	½	503415	BTS-150K 5%	
R29	150KΩ 5%	½	503415	BTS-150K 5%	
R30	18Ω 5%	½	33568	BTS-18 5%	
R31	680Ω	½	504168	BTS-680	
R32	56KΩ 5%	½		BTS-56K 5%	Note 1
R33	180Ω 5%	½	502118	BTS-180 5%	
R34	470Ω	½	504147	BTS-470	
R35	3900Ω 5%	½	502339	BTS-3900 5%	
R36	1Meg	½	502510	BTS-1Meg	
R37	33KΩ	½	502333	BTS-33K	
R38	2200Ω	½	502222	BTS-2200	
R39	330Ω	½		BTS-330	Note 1
R40	56KΩ	½	512356	BTA-56K	
R41	4700Ω	½	502247	BTS-4700	
R42	82KΩ	½	38219	BTS-82K	
R43	3900Ω	½	502239	BTS-3900	
R44	470KΩ	½	502447	BTS-470K	
R45	180Ω	½	502118	BTS-180	
R46	6800Ω 5%	½	512268	BTA-6800 5%	
R47	470KΩ	½	502447	BTS-470K	
R48	1000Ω	½	502210	BTS-1000	
R49	1000Ω	½	502210	BTS-1000	
R50	47KΩ	½	502347	BTS-47K	
R51	120Ω	½	503112	BTS-120	
R52	1000Ω	½	504310	BTS-1000	
R53	39KΩ	½	503339	BTS-39K	
R54	47KΩ	½	502347	BTS-47K	
R55	10KΩ 5%	½	502310	BTS-10K 5%	
R56	10KΩ 5%	½	502310	BTS-10K 5%	
R57	10Meg	½	502510	BTS-10Meg	
R58	330KΩ	½	502433	BTS-330K	
R59	820KΩ 5%	½	502482	BTS-820K 5%	
R60	1Meg 5%	½	502510	BTS-1Meg 5%	
R61	470Ω	2	522167	BTS-470	
R62	270KΩ	½	502437	BTS-270K	
R63	1.5Meg 5%	½	502515	BTS-1.5Meg 5%	
R64	1.5Meg 5%	½	502515	BTS-1.5Meg 5%	
R65	1.5Meg 5%	½	502515	BTS-1.5Meg 5%	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No	RATING OHMS	RATING WATT	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.	NOTES
R66	560KΩ	½	502456	BTS-560K	
R67	33KΩ	½	502333	BTS-33K	
R68	10KΩ	1	512310	BTA-10K	
R69	3900Ω 5%	½	502239	BTS-3900 5%	
R70	22KΩ	½	502322	BTS-22K	
R71	18KΩ	½	3219	BTS-18K	
R72	470KΩ	½	502447	BTS-470K	
R73	18KΩ 5%	½	3219	BTS-18K 5%	
R74	8200Ω	½	502282	BTS-8200	
R75	390KΩ	½	503439	BTS-390K	
R76	33KΩ 5%	½	502333	BTS-33K 5%	
R77	22KΩ	½	502322	BTS-22K	
R78	22KΩ 5%	½	502322	BTS-22K 5%	
R79	470KΩ	½	502447	BTS-470K	
R80	680KΩ 5%	½	30562	BTS-680K 5%	
R81	150KΩ	½	502432	BTS-150K	
R82	230KΩ	½	503415	BTS-230K	
R83	560Ω	½		BTS-560	
R84	560Ω	½		BTS-560	
R85	150KΩ	½	503418	BTS-160K	
R86	820KΩ	½	502482	BTS-820K	
R87	150KΩ 5%	½	503415	BTS-150K 5%	
R88	330KΩ	½	502433	BTS-330K	
R89	82KΩ 5%	½	502282	BTS-82K 5%	
R90	3900Ω	½	502239	BTS-3900	
R91	100KΩ 5%	1	512410	BTA-100K 5%	
R92	6.8Meg	½	31071	BTS-6.8Meg	
R93	47KΩ	½	502347	BTS-47K	
R94	820KΩ	½	502482	BTS-820K	
R95	39KΩ	½	71084	BTS-39K	
R96	1Meg	½	502510	BTS-1Meg	
R97	47Ω	½	503047	BTS-47	
R98	100Ω	2	79701		
R99	18KΩ	2	523315	BTB-18K	
R100	270KΩ	½	503256	BTS-270K	
R101	56KΩ	½	503437	BTS-56K	
R102	1000Ω	½		BTS-1000	
R103	100KΩ	½	503410	BTS-100K	
R104	820KΩ 5%	½	502482	BTS-820K 5%	
R105	68KΩ	½	502268	BTS-68K	
R106	L. 8Meg	½		BTS-L. 8Meg	Note 3

Note 1: Not used in some versions.
Note 2: Chassis KCS87A and KCS87D use a 560KΩ resistor in this application.
Note 3: Used in chassis KCS87A and KCS87D.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	550VCT	5VAC	79163					P9733 ①	
	② L. 8A	.300ADC	③ 3A							
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC									
	④ 8A									

① Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: RCA Victor PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Horiz. Output Trans.	79736	P5411* ①	HVO-P* ①		X080* ①	A-8233* ①	FLY-24* ①	D-19* ①
T3	Vert. Output Trans.	79145					A-8145 ② ③		
T4A	Yoke-Horiz. (53MH)	79510 ④	DF603 ④	MDF-73 ④		T70F14/43 ④	DY-8A ④	Y-T ⑦	Y-17-1 ⑦
B	Vert. (36MH)	79868 ⑤							
T5	Width (3.7-17MH)	79144	RF800 ⑥ 10	MWC-6 ⑥		20UR16 ⑥	WC-8	WC-18 ⑥	WC-12 ⑥ 11

① Drill new mounting hole(s).
② Connect as auto transformer.
③ Use original mounting bracket.
④ Includes C99, R85, R84 and R102.
⑤ Used only in chassis KCS87C and KCS87D.
⑥ See instructions packed with unit pertaining to yoke damping network.
⑦ Correct horiz. network across terminals #3 and #7. Use original network if necessary.
⑧ Remove damping capacitor across terminals #1 and #2. Use original network if necessary.
⑨ Enlarge mounting hole.
10 Connect to coded #1 and #2 terminals.
11 Connect to coded blue and red terminals.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	9	9		9	7	9	9
	4	8	8		7 & 8	6	8	7 & 8
	3	5	5		5	5	5	5
	2	3	3		3	4	3	3
	1	1	1		1	3	1	1
Connect Width Coil Across	2 & 1	3 & 1	3 & 1		3 & 1	3 & 4	3 & 1	3 & 1
Special Notes								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T6	4.2KΩ	3.5Ω	79159	A-3949	A-3019	S-52	21006	26S60 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	REPLACEMENT DATA: RCA Victor PART No	JENSEN PART No	QUAM PART No	NOTES
SP1	4	PM	3.5Ω	79696	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA: RCA Victor PART No.	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	Ant. Matching Trans.	.6Ω	.6Ω	79733				Note 1
L2	Ant. Matching Trans.	.6Ω	.6Ω	79733				Note 1
L3	IF Trap	0Ω		79733				Note 1
L4	Ant. Shunt Coil	0Ω		79733				Note 1
L5	Ant. Shunt Coil	0Ω		79733				Note 1
L6	IF Trap	0Ω		79733				Note 1
L7	FM Trap	0Ω		79733				
L8	Ant. Coils	0Ω		79724				Includes stator complete with rotor, cage, & coils
L9	Ant. Coil	0Ω		79724				Stator complete with rotor, cage, & coils
L10	Ant. Coil	0Ω		73461				Channel 5, part of complete assembly
L11	Fil. Choke	0Ω		79720				Channel 13, part of complete assembly
L12	RF Coil	0Ω		79721				Stator complete with rotor, coils, caps, and resistor
L13	RF Coils	0Ω		79726				
L14	RF Coil	0Ω		73460				Channel 8, part of complete assembly
L15	Mixer Grid Coils	0Ω		79723				Stator complete with rotor, coils, cage and resistors
L16	Mixer Grid Coil	0Ω		79723				Channel 6, part of complete assembly
L17	Mixer Grid Coil	0Ω		79723				Channel 13, part of complete assembly
L18	Fil. Choke	0Ω		79720				Stator complete with rotor and coils
L19	Osc. Coils	0Ω		79722				Channel 15, part of complete assembly Includes 27KΩ resistor
L20	Osc. Coil	0Ω		79722				
L21	Conv. Plate	.1Ω		79734				
L22	47.25MC Trap	.1Ω		78204				
L23	1st. Video IF	0Ω		76203	17-4523		6319	
L24	Fil. Choke	0Ω		73477	19-3001	TV-189	6604	
L25	2nd. Video IF	0Ω	.2Ω	76433	17-4533		6319	
L26	Fil. Choke	0Ω		73477	19-3001	TV-189	6604	
L27	3rd. Video IF	.2Ω	.2Ω	76433	17-4533		6319	
L28	4th. Video IF	.2Ω	.2Ω	76433	17-4533		6319	
L29	Series Peaking Coil	2.8Ω		760Ω	19-3036	TV-180	6176	36 Microhenries
L30	Shunt Peaking Coil	10.5Ω		71526	19-3250	TV-185	6181	250 Microhenries
L31	Series Peaking Coil	7Ω		77674	19-3250 ■	TV-185 ■	6181 ■	250 Microhenries wound on 27KΩ resistor
L32	Shunt Peaking Coil	4.2Ω		75253	19-3135		6153	120 Microhenries
L33	4.5MC Trap	9.5Ω		79157	17-3402 ▲			Not used in Ch. KCS87D
L34	Shunt Peaking Coil	15Ω		75252	19-3500	TV-188	6174	500 Microhenries
L35	Series Peaking Coil	5.5Ω		71526	19-4180	TV-183	6179	180 Microhenries, wound on 39KΩ resistor
L36	Sound IF	2.3Ω		79140	16-3445 ▲	TV-113 ▲	6203 ▲	
L37	Ratio Detector	90	.2Ω CT	79141	17-3497 ▲	TV-115 ▲	6205 ▲	Tertiary winding - .3Ω
L38	Horiz. Osc.	45Ω		78693	20-1402 †	TV-183 †	6183 †	Tapped ④ 52Ω
L39	Horiz. Phase	45Ω		78693	20-1402 †	TV-183 †	6183 †	
L40	RF Choke	.72Ω		78690	19-1001		6604	1.5 Microhenries, IRC part #CL-1

Note 1. Complete antenna matching transformer part #79733 (includes L, L2, L3, L4, L5, L6, L7, C4, C5, C6 and C7.
* Use one winding only.
■ Parallel with 27KΩ resistor.
▲ Do not use tap winding.
▲ Terminals sufficient mounting support and use one winding.
† Replaces horizontal oscillator and horizontal phase coils. Cut out chassis hole and drill mounting holes.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ~/s	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L41	300A	L. 3HY	3Ω	77676	C-3336 ①	C-2996 ①	C-33X	C903T ①	28C64 ①

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

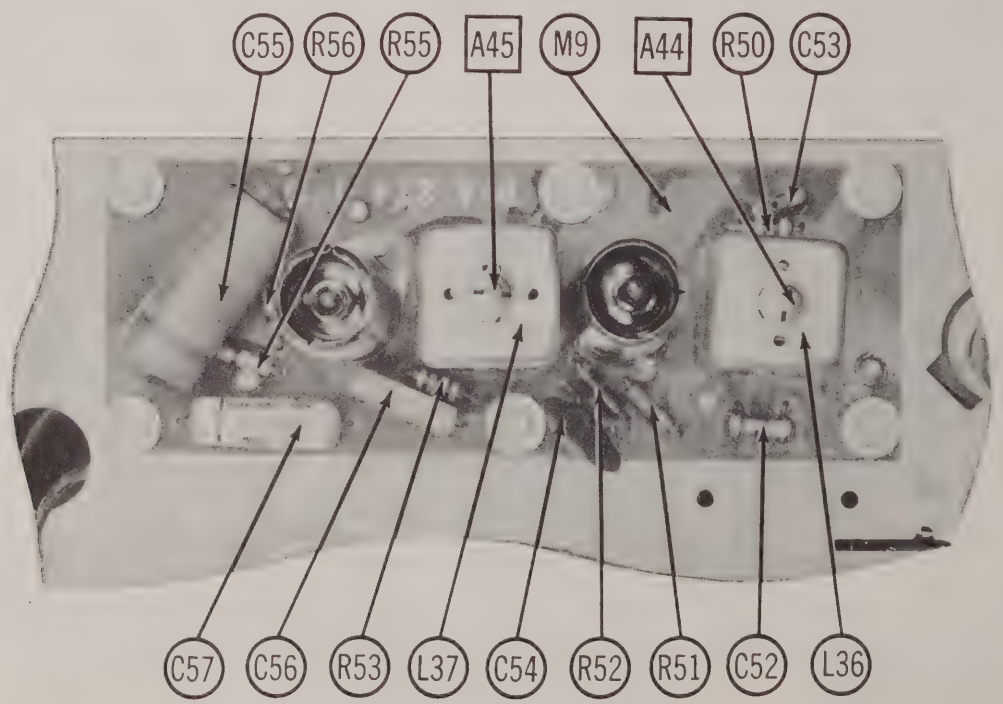
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RCA Victor PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	.3A 250V	78214	78218	312.300 (3AG-3A)	357001	AGC 3/10	4405

CRYSTAL DIODES

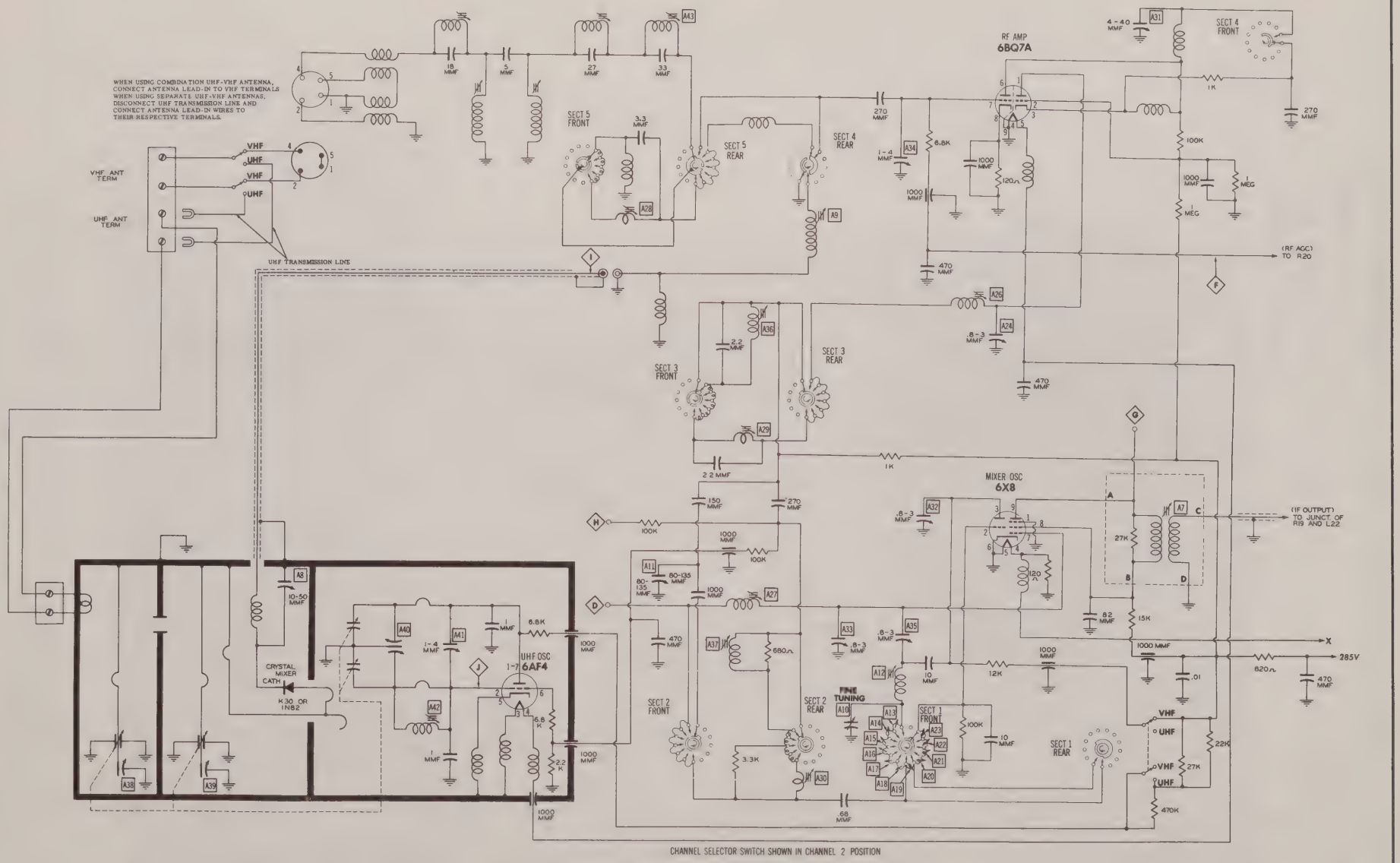
ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		RCA Victor PART No.	SYLVANIA PART No.		
M2	K60	76675	1N60 or 1N132		Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M3	Pilot Light	11891	Used in VHF-UHF models only.
M4	Tuner	KRK-32	VHF - Models 17-S-450, 451, 453 & 21-S-500
M5A	Tuner	KRK-30A	VHF-UHF - Models 17-S-450U, 451U & 453U
B	Tuner	KRK-30	VHF-UHF - Model 21-S-500U
M6	Switch	79374	VHF-UHF - VHF-UHF models only.
M7	Centering Magnet	76375	
M8A	Ion Trap	76141	Models 17-S-450, U, 451, U and 453, U.
B	Ion Trap	77007	Models 21-S-500, U.
M9	Printed Circuit	79142	Sound IF
A5	Trimmer Cap.	78220	Video IF Input Trimmer (5-70MMF)
A31	Trimmer Cap.	77616	VHF-UHF Tuner (RF Plate Trimmer) - VHF-UHF Models
B3	Trimmer Cap.	71807	Horiz. Drive (10-160MMF)
	Knob	79444	Contrast - Models 17-S-453, U.
	Knob	79862	Contrast - Models 21-S-500, U.
	Knob	79470	Contrast - Models 17-S-450, U, 451, U.
	Knob	79445	On-Off-Volume - Models 17-S-453, U.
	Knob	79471	On-Off-Volume - Models 17-S-450, U, 451, U.
	Knob	79863	On-Off-Volume - Models 21-S-500, U.
	Knob	79426	UHF Channel Sel. - Model 17-S-453U
	Knob	79467	UHF Channel Sel. - Models 17-S-450U, 451U, 21-S-500U.
	Knob	79465	UHF Fine Tuning - VHF-UHF Models
	Knob	79425	VHF Channel Sel. - Model 17-S-453
	Knob	79466	VHF Channel Sel. - Models 17-S-450, 451
	Knob	79865	VHF Channel Sel. - Model 21-S-500
	Knob	79464	VHF Fine Tuning - Models 17-S-450, 451, 453.
	Knob	79864	VHF Fine Tuning - Model 21-S-500
	Knob	79133	"Local-Distant" - Model 21-S-500U
	Knob	79533	Horiz. Freq. - Models 17-S-450, U, 451, U, 453, U.
	Knob	79132	Brightness or Vert. Hold - Models 21-S-500, U.
	Knob	79866	Horiz. Freq. or Dummy "Local-Distant" - Model 21-S-500.
	Safety Glass	79688	Models 17-S-450, U, 451, U, 453, U.
	Safety Glass	78329	Models 21-S-500, U.



SOUND IF SUB-CHASSIS


WHEN USING COMBINATION UHF-VHF ANTENNA, CONNECT ANTENNA LEAD-IN TO VHF TERMINALS WHEN USING SEPARATE UHF-VHF ANTENNAS, DISCONNECT UHF TRANSMISSION LINE AND CONNECT ANTENNA LEAD-IN WIRES TO THEIR RESPECTIVE TERMINALS.
VHF ANT TERM
UHF ANT TERM
VHF
UHF
VHF
UHF
UHF TRANSMISSION LINE
RF AMP 6BQ7A
SECT 4 FRONT
SECT 4 REAR
SECT 5 FRONT
SECT 5 REAR
(RF AGC) TO R20
SECT 3 FRONT
SECT 3 REAR
MIXER OSC 6X8
(IF OUTPUT) TO JUNCT OF R19 AND L22
285V
FINE TUNING
SECT 2 FRONT
SECT 2 REAR
SECT 1 FRONT
SECT 1 REAR
UHF OSC 1-7 6AF4
CRYSTAL MIXER CATH
K30 OR 1N82
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION

UHF-VHF TUNER KRK30, A USED ON CHASSIS KCS87A AND KCS87D

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

ALTERNATE TUNER SCHEMATIC

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16 and V17. Check M1 fuse. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T5, C97, C96, C94, R99, R98 and other associated components.	Check L38, L39, C89, C90, C93, R95, R93 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16 and V18. Check C93, R99, R95 and other associated components. Check adjustments B3 and B4.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check C93, T2, R99 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V11. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

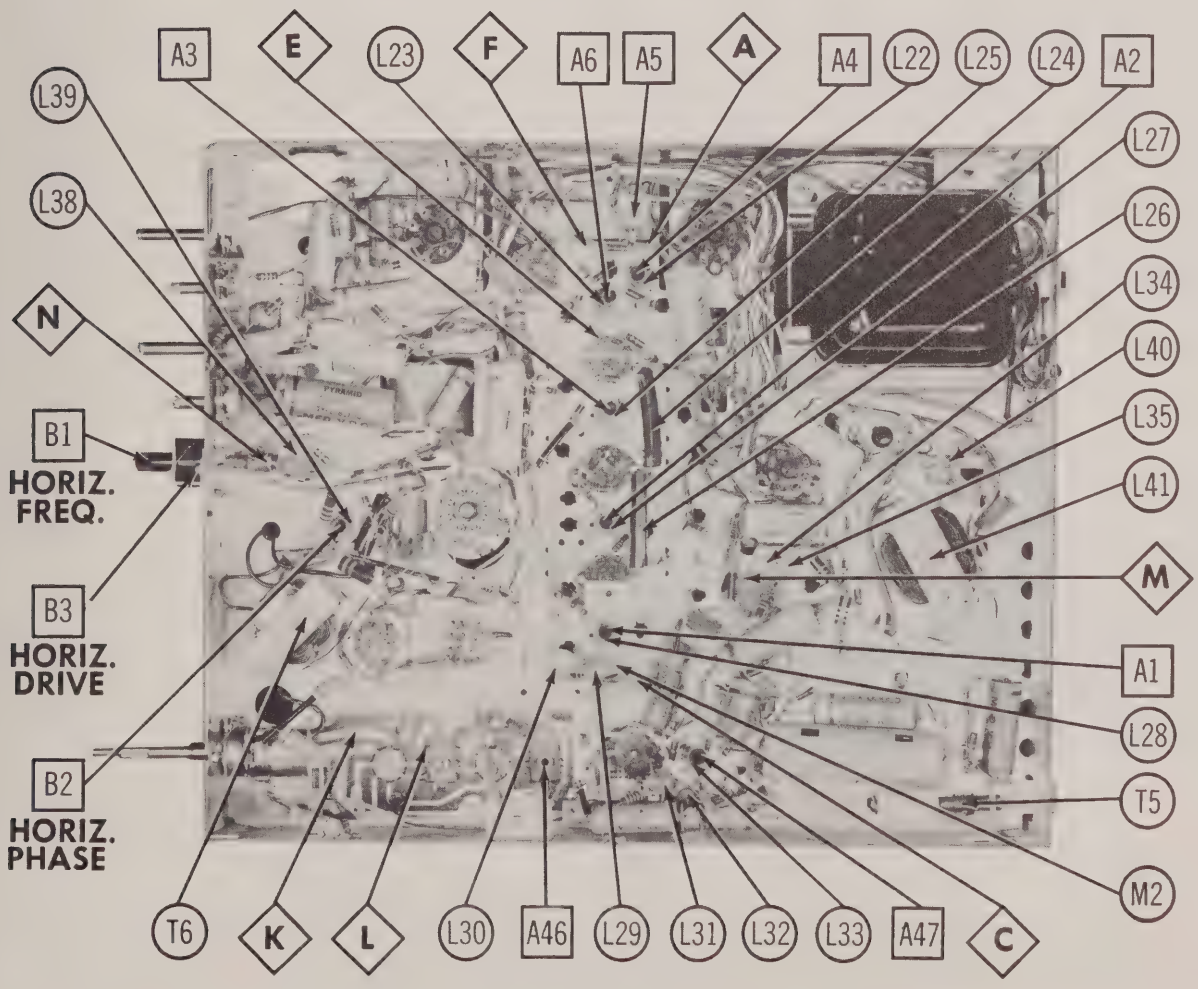
KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

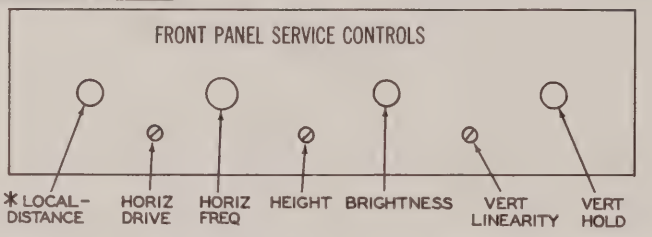
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove rear cover, Remove 4 spring clips from safety glass molding (located inside cabinet). Remove metal molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - AGC FIELD ADJUSTMENT

If receiver overloads on a strong signal,turn AGC control counter clockwise until picture on screen shows no sign of overload or pulling.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency slug (B1) is located on the front panel of the chassis and is used as the horizontal hold control. If horizontal sync cannot be brought in with B1, set it at approximately at its mid-range position and bring picture in sync with B2.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L37) located on bottom of chassis . (Hole is provided in bottom of cabinet for adjustment). (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

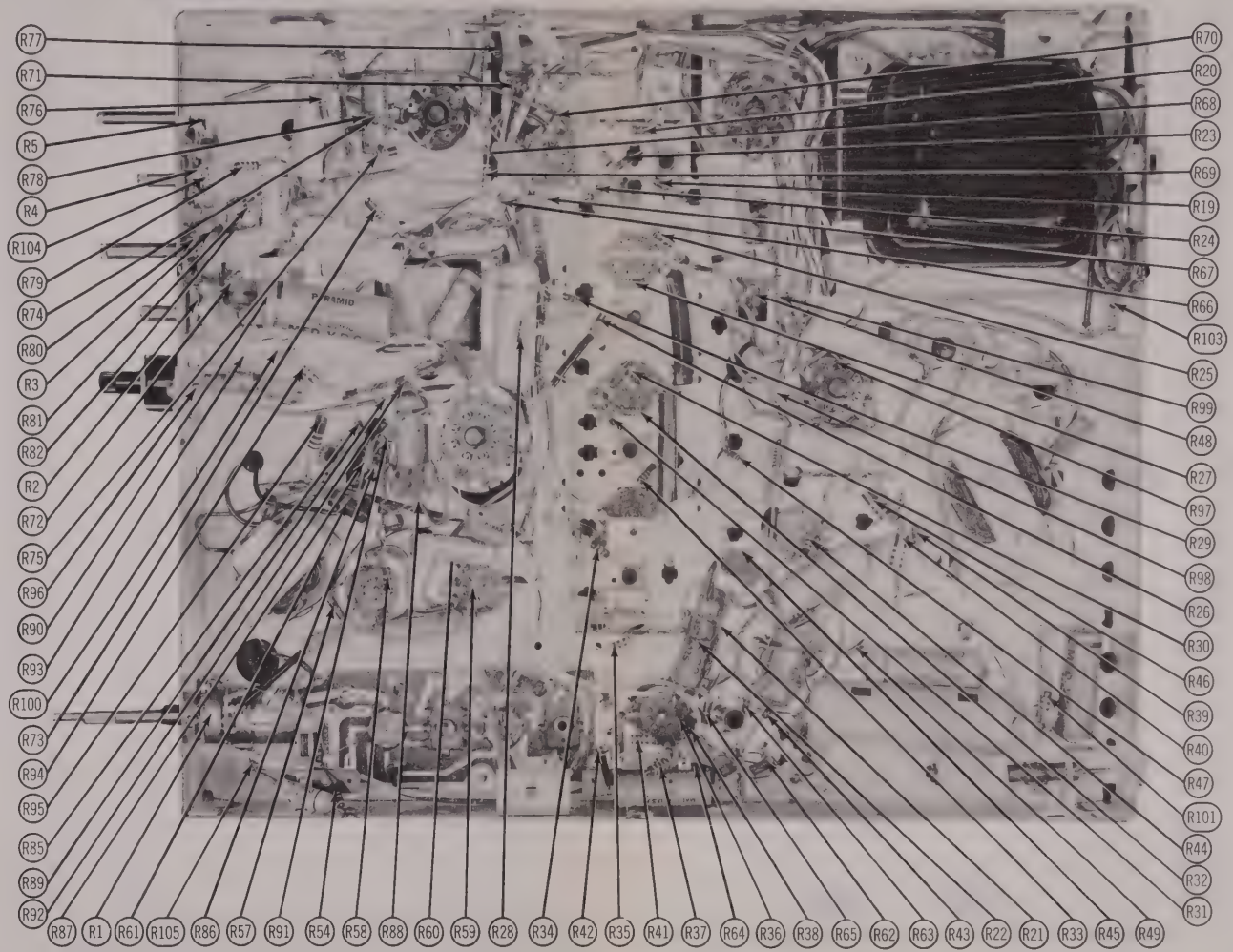
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 2 metal screws and 2 spring clips. Remove rear cover.
3. Disconnect picture tube socket, 2 speaker leads, deflection yoke socket and HV lead.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.

PICTURE TUBE REMOVAL

1. Remove chassis and lay cabinet face down.
2. Remove 4 front tube mounting bolts.
3. Remove picture tube and yoke assembly.
4. Remove 2 nuts from yoke assembly. Remove yoke assembly from picture tube.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PHOTOFACT* Folder

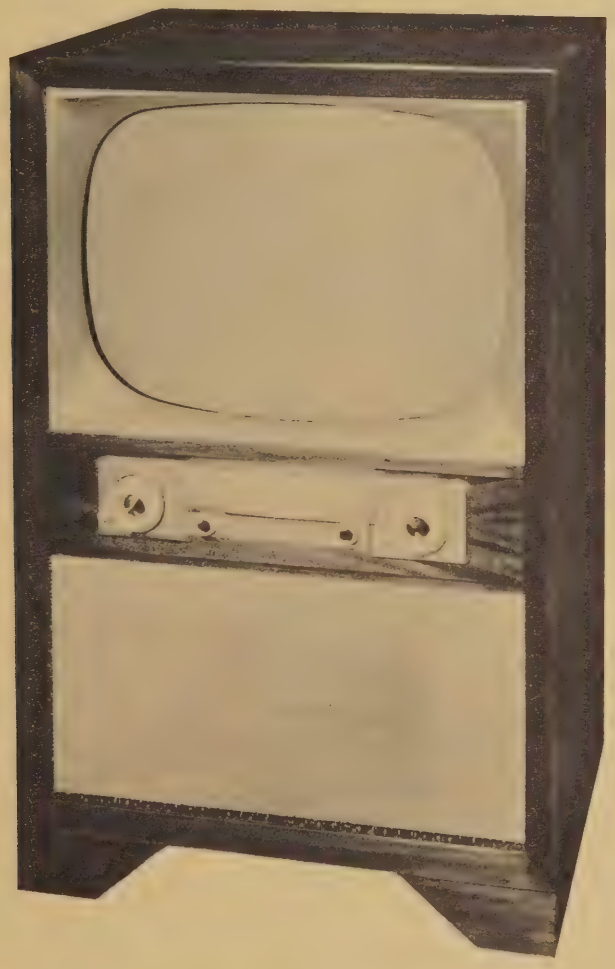
RETMA MEMBER

STEWART-WARNER MODELS 21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



MODEL 21C-9600K

STEWART-WARNER MODELS 21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D

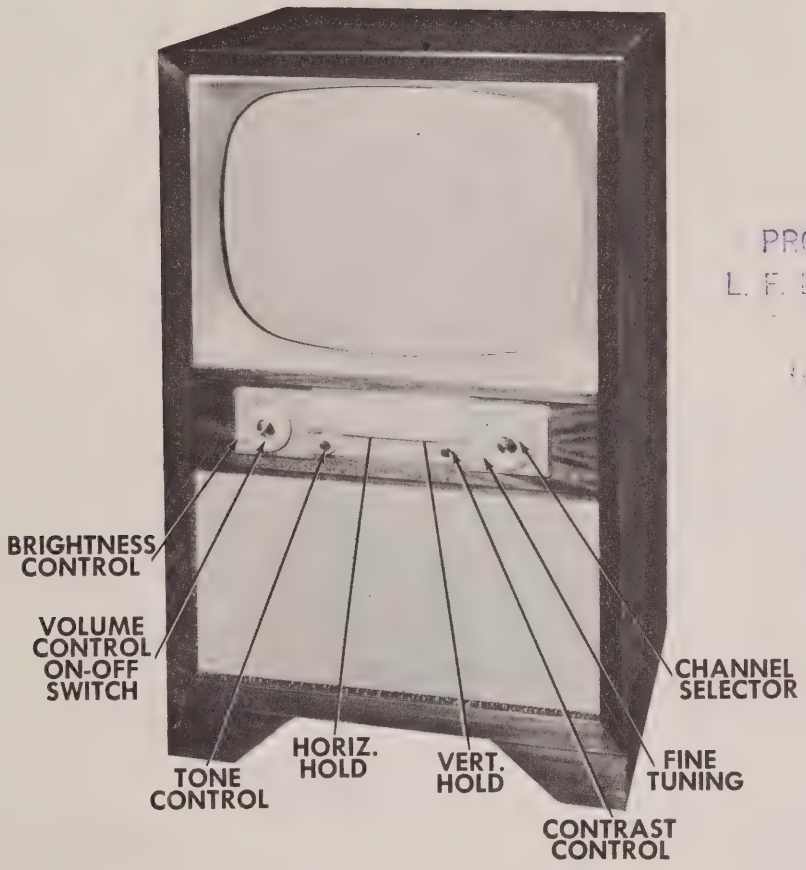
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

DATE 5–55 SET 277 FOLDER 11

PHOTOFACT* Folder
*TRADE MARK

STEWART-WARNER MODELS 21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D



PROPERTY OF
L. F. BLANKENSHIP
[illegible] ST.
[illegible] 81088A00

STEWART-WARNER MODELS 21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D

STEWART-WARNER MODEL 21C-9600K

TRADE NAME	Stewart-Warner Models 21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D
MANUFACTURER	Stewart-Warner Electric, Div. of Stewart-Warner Corp., 1300 N. Kostner Ave., Chicago 15, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC - 60 Cycle RATING 1.47 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.0MC, Sound IF 21.5MC (Intercarrier)

INDEX

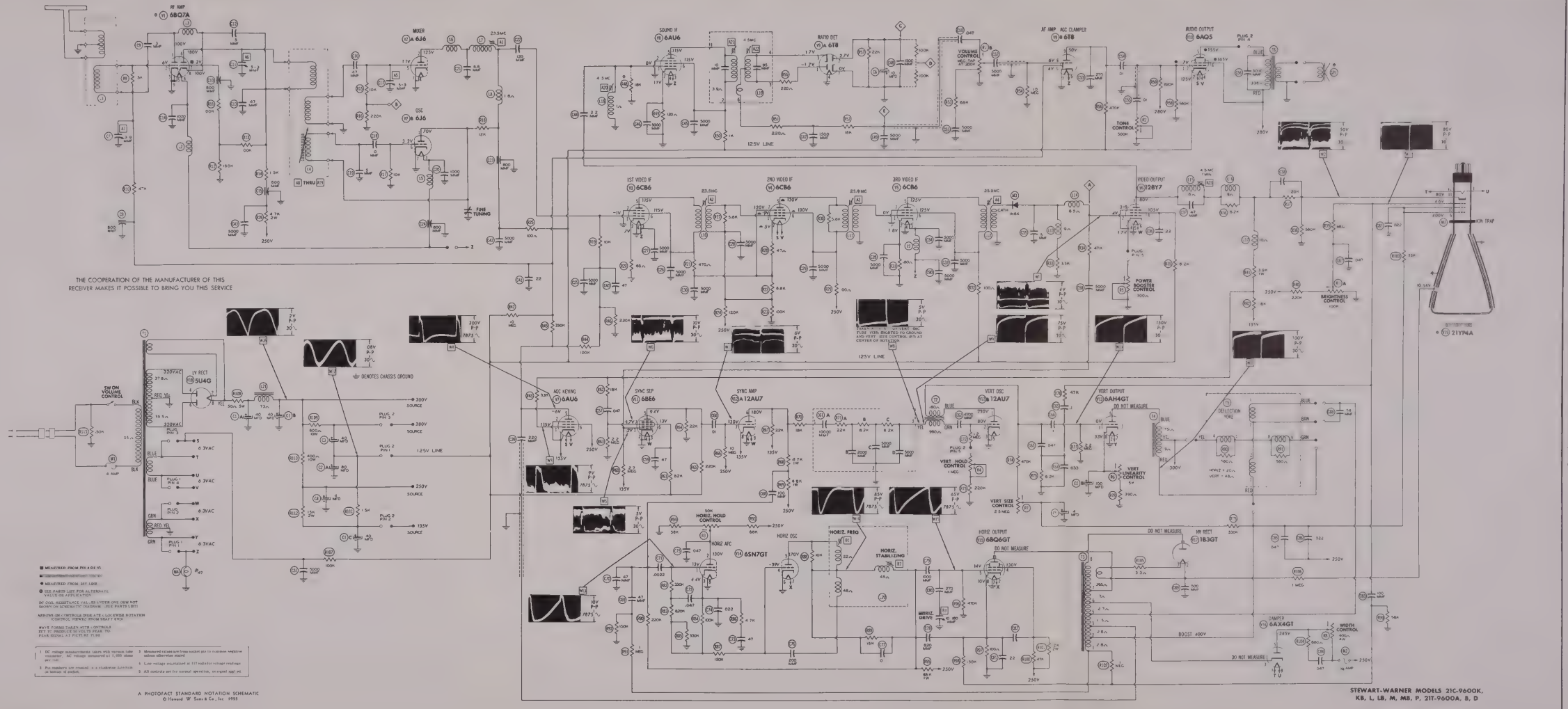
Alignment Instructions 6, 7
Disassembly Instructions 18
Horizontal Sweep Circuit Adjustments 11
Parts List and Descriptions ..... 15 thru 16
Photographs
- Cabinet-Rear View 11
- Capacitor Identification 4, 9
- Chassis-Top View 3
- RF Tuner 10
- Resistor Identification 19, 20

Photographs (Cont)
- Trans., Inductor & Alignment Identification 16

Production Changes 17
Resistance Measurements 8
Servicing in the Field 18
Schematic 2
Trouble Shooting Aids 12, 17
Tube Failure Check Chart 5
Tube Placement Chart (Bottom View) 8
Tube Placement Chart (Top View) 5

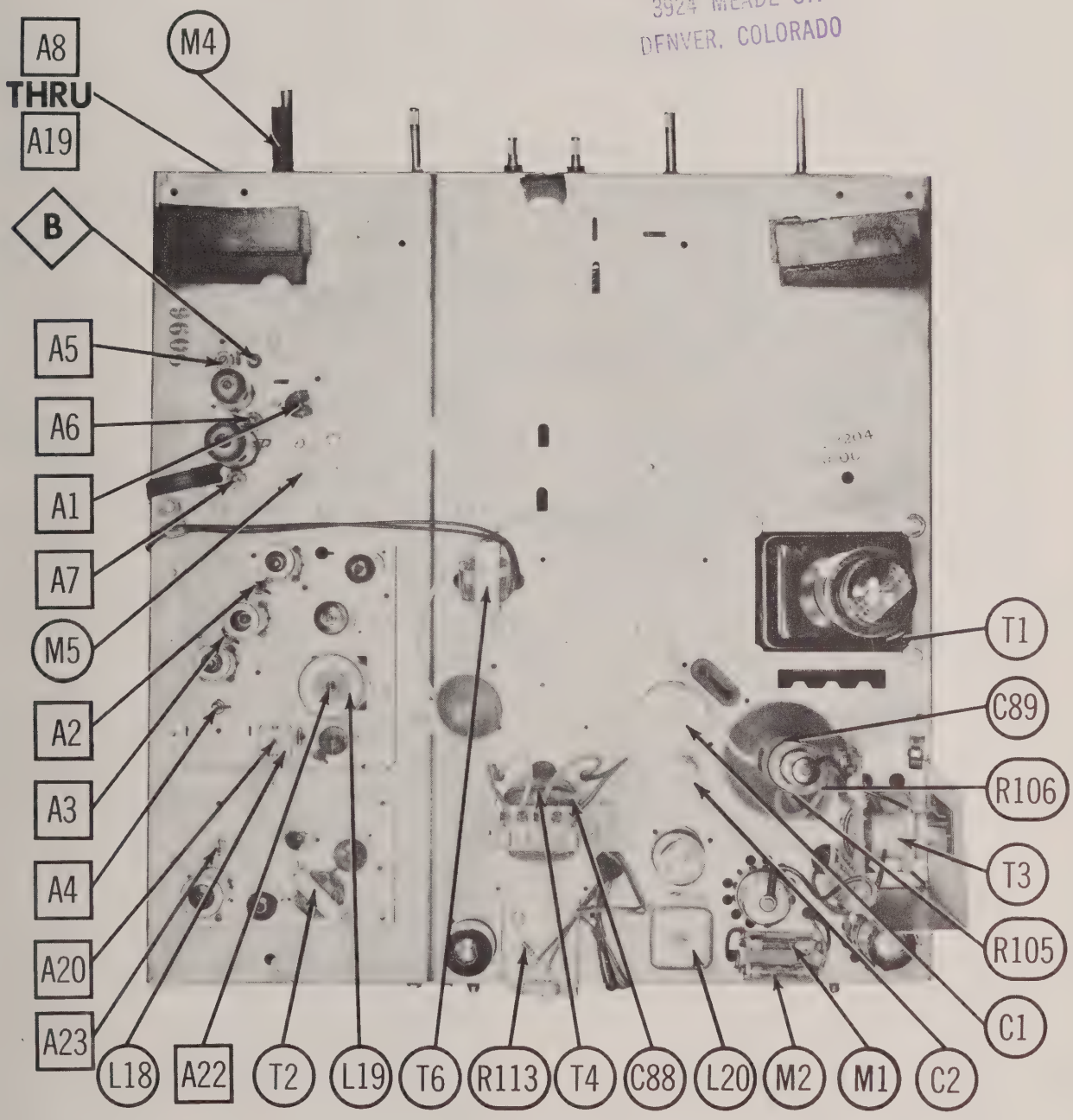
HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

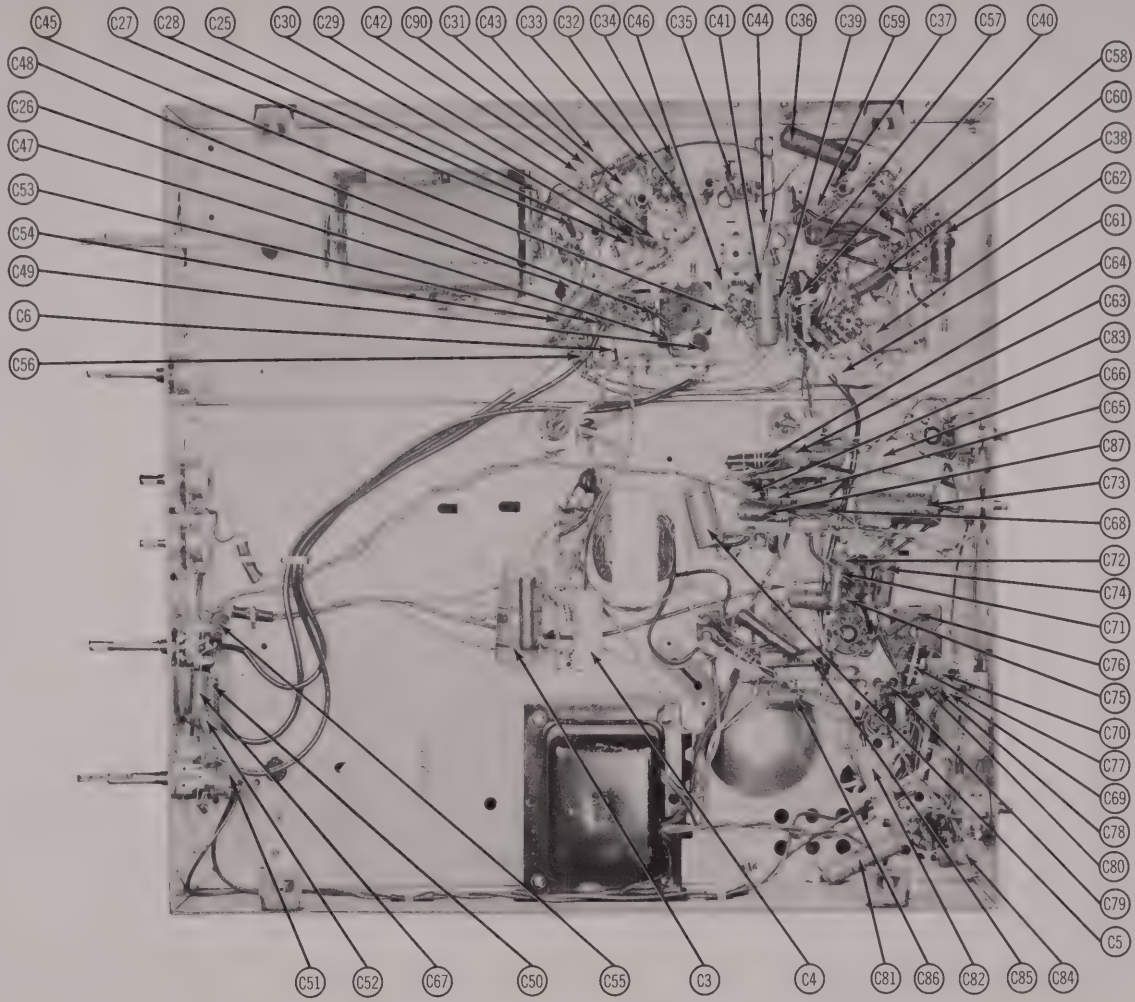


STEWART-WARNER MODELS
21C-9600K, KB, L, LB, M, MB, P, 21T-9600A, B, D

PROPERTY OF
[illegible] LANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



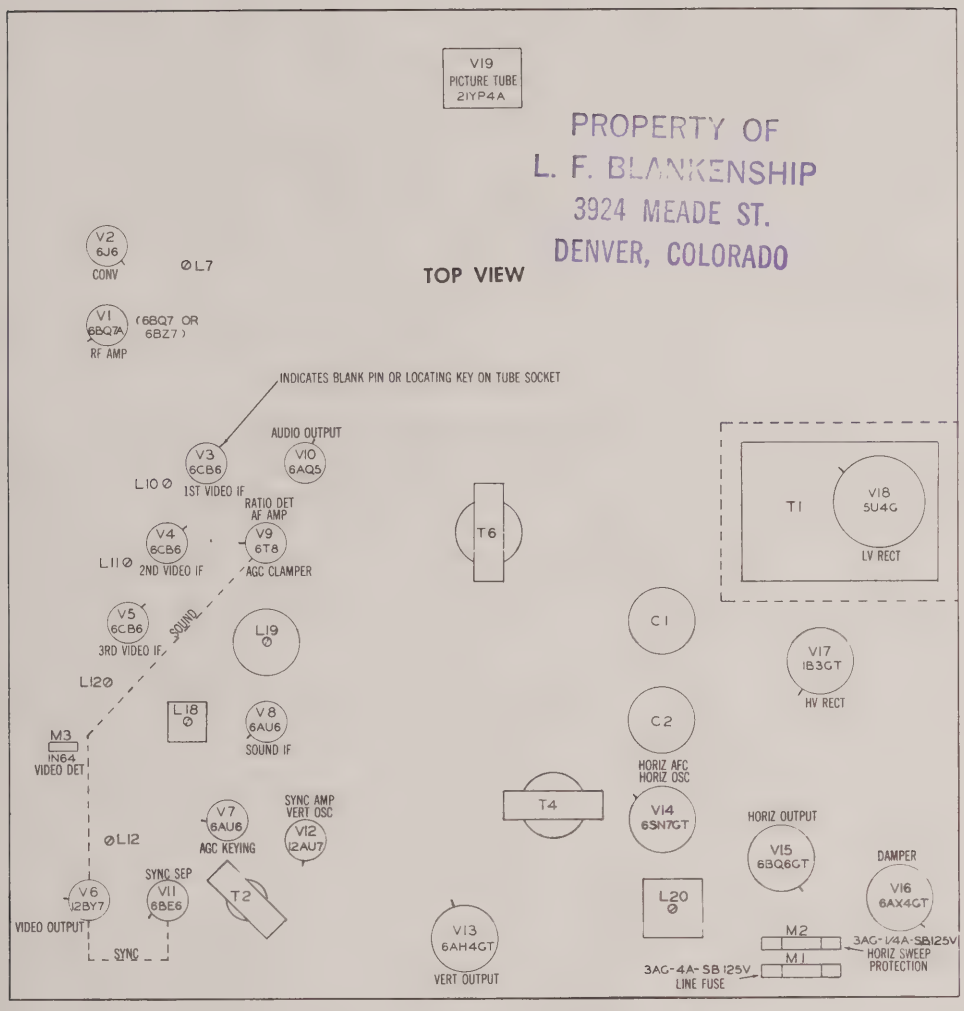
CHASSIS TOP VIEW



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V18, Fuse (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V10**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V7, V19**
Has pic, no sound - **V8, V9, V10**
Overloaded picture - **V7, V9**

SYNC FAILURE
No vert. sync - **V12**
No horiz. sync - **V12, V14**
No vert. or horiz. sync - **V11, V12**

SWEEP FAILURE
No raster, has sound - **V14, V15, V16, V17, V19, Fuse (M2)**
No vertical deflection - **V12, V13**
Poor vert. linearity or foldover - **V12, V13**
Poor horiz. linearity or foldover - **V14, V15, V16**
Narrow picture - **V14, V15, V16, V17, V18**
Vert. off freq. - **V12**
Horiz. off freq. - **V12, V14**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If picture tube is removed from the set, the high lead should be securely taped and kept away from chassis. Do not remove horizontal oscillator tube (V14) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace with a 6J6 which has pin 1 clipped off. This will disable the local oscillator and reduce the possibility of erroneous indications. This may also be done by placing a strip of transparent cellulose tape on the first two contacts from front of tuner assembly. Use any unused channel strip and rotate drum to this insulated position.
Short antenna terminals with a jumper wire.
Connect a negative lead of a 3 volt battery to the ungrounded side of C40. Positive lead to chassis. If IF stages are badly misaligned, they may break into oscillation. This will be indicated by excessive deflection on VTVM. Also, the voltage due to IF oscillation will be uneffected by signal strength from the generator.
When and if oscillation occurs, it may be eliminated by detuning the IF coils in different directions or increasing the bias voltage to 4.5 volts.
If increased bias is used during alignment, check to see if the IF channel is stable with reduced bias.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1	Direct	High side to ungrounded tube shield floating over dummy converter tube. Low side to chassis.	23.5MC	Any	DC probe thru 10KΩ to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2	"	"	"	"	"	A2	"
3	"	"	25.9MC	"	"	A3	"
4	"	"	"	"	"	A4	"

OVERALL VIDEO IF RESPONSE CHECK

Place a piece of transparent cellulose tape over first two contacts from front of VHF strip. (Any unused channel). During overall IF check, switch tuner to this insulated strip.
Short antenna terminals. Set attenuator on marker generator so as not to distort waveform on scope.
Adjust attenuator on sweep generator for VTVM reading of 1 volt. Be sure a 3 volt battery is connected to AGC. Negative lead to ungrounded side of C40. Positive side to chassis. Do not use any higher bias voltage.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Connect a .001MFD capacitor across the vertical amplifier input terminals of oscilloscope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5	Direct	High side to ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.5MC 26.0MC	Any	Vert. amp. thru 10KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, retouch A1 thru A4 to obtain desired response. If sound Marker 21.25MC cannot be seen, increase vertical gain control on scope.

TUNER ALIGNMENT

The channel oscillator adjustment screws are reached through a hole to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the bias battery as in "Video IF Alignment".
Connect a .001MFD capacitor across the vertical input terminals of the oscilloscope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.
Before oscillator alignment of tuner is attempted, be sure IF alignment is correct.

RF AND MIXER ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. amp. of scope to point (B). Low side to chassis.	A5, A6, A7	Adjust for response curve similar to Fig. 2. Adjust A5 and A6 to obtain correct amplitude of picture and sound carrier markers. Adjust A7 to equalize the overall amplitude. Do not overly broaden the curve as it will result in loss of sensitivity.
7	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel, make compromise adjustments of A5, A6, and A7 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

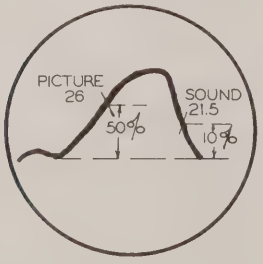


FIG. 1

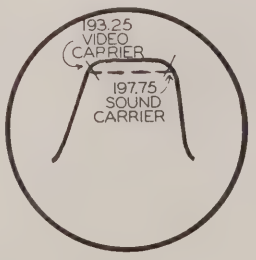


FIG. 2

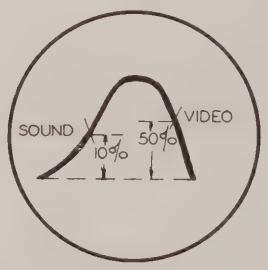


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193. 25MC 197. 75MC	10	Vert. amp. thru 10KΩ to point Ⓐ. Low side to chassis. (Connect VTVM across vert. input terminals of scope.)	A8	Attenuate sweep generator output to maintain not more than .5 volts at VTVM. Adjust to place video marker at 50% on response curve with sound carrier markers as in Fig. 3.
			213MC (10MC Swp)	211. 25MC 215. 75MC	13		A9	
			207MC (10MC Swp)	205. 25MC 209. 75MC	12		A10	
			201MC (10MC Swp)	199. 25MC 203. 75MC	11		A11	
			189MC (10MC Swp)	187. 25MC 191. 75MC	9		A12	
			183MC (10MC Swp)	181. 25MC 185. 75MC	8		A13	
			177MC (10MC Swp)	175. 25MC 179. 75MC	7		A14	
			85MC (10MC Swp)	83. 25MC 87. 75MC	6		A15	
			79MC (10MC Swp)	77. 25MC 81. 75MC	5		A16	
			69MC (10MC Swp)	67. 25MC 71. 75MC	4		A17	
			63MC (10MC Swp)	61. 25MC 65. 75MC	3		A18	
			57MC (10MC Swp)	55. 25MC 59. 75MC	2		A19	

PROPERTY OF
BLANKEN
3524 MEADE
DENVER, CO

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Set power booster fully counter clockwise.
Connect two matched 100KΩ (±1%) resistor in series from point Ⓒ to chassis. The junction of these two resistors is alignment point Ⓓ as shown on the schematic. Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9	.001MFD	High side to point Ⓐ. Low side to chassis.	4. 5MC (Unmod)	Any	DC probe to point Ⓒ. Common to chassis.	A20, A21	Adjust for maximum deflection. A21 is located on bottom of chassis.
10	"	"	"	"	DC probe to point Ⓒ. Common to point Ⓓ.	A22	Adjust for zero reading. A positive reading will be obtained on either side of the correct setting. Replace V5 in its socket. If a buzz in sound is heard on TV station, adjust A22 for clearest sound with minimum buzz. A22 is located on top of chassis.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Set power booster control fully counter clockwise. Remove V5 from its socket.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9	.001MFD	High side to point Ⓐ. Low side to chassis.	4. 5MC (450KC Swp)	4. 5MC	Any	Vert. amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A20, A21	Disconnect stabilizing capacitor (C6). Adjust for response curve of maximum amplitude and symmetry similar to Fig. 4.
10	"	"	"	"	"	Vert. amp. thru 10KΩ to point Ⓔ. Low side to chassis.	A22	Reconnect stabilizing capacitor (C6). Adjust A22 (located on top of chassis) so that 4. 5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A21 for maximum amplitude and straightness of crossover lines. Replace V5 in its socket. Tune in a TV station. If a buzz is heard, adjust A22 for maximum sound with minimum buzz.

4.5MC TRAP ADJUSTMENT

Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11	.001MFD	High side to point Ⓐ. Low side to chassis.	4. 5MC (Unmod)	Any	DC probe thru detector or as shown in Fig. 6. Low side to chassis.	A23	Adjust for MINIMUM deflection.

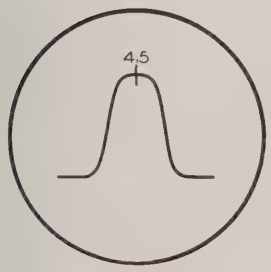


FIG. 4

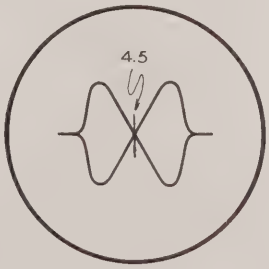


FIG. 5

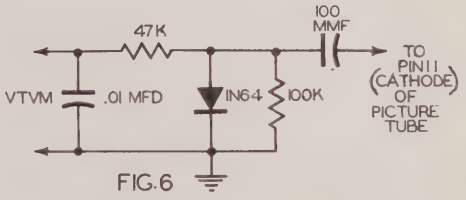
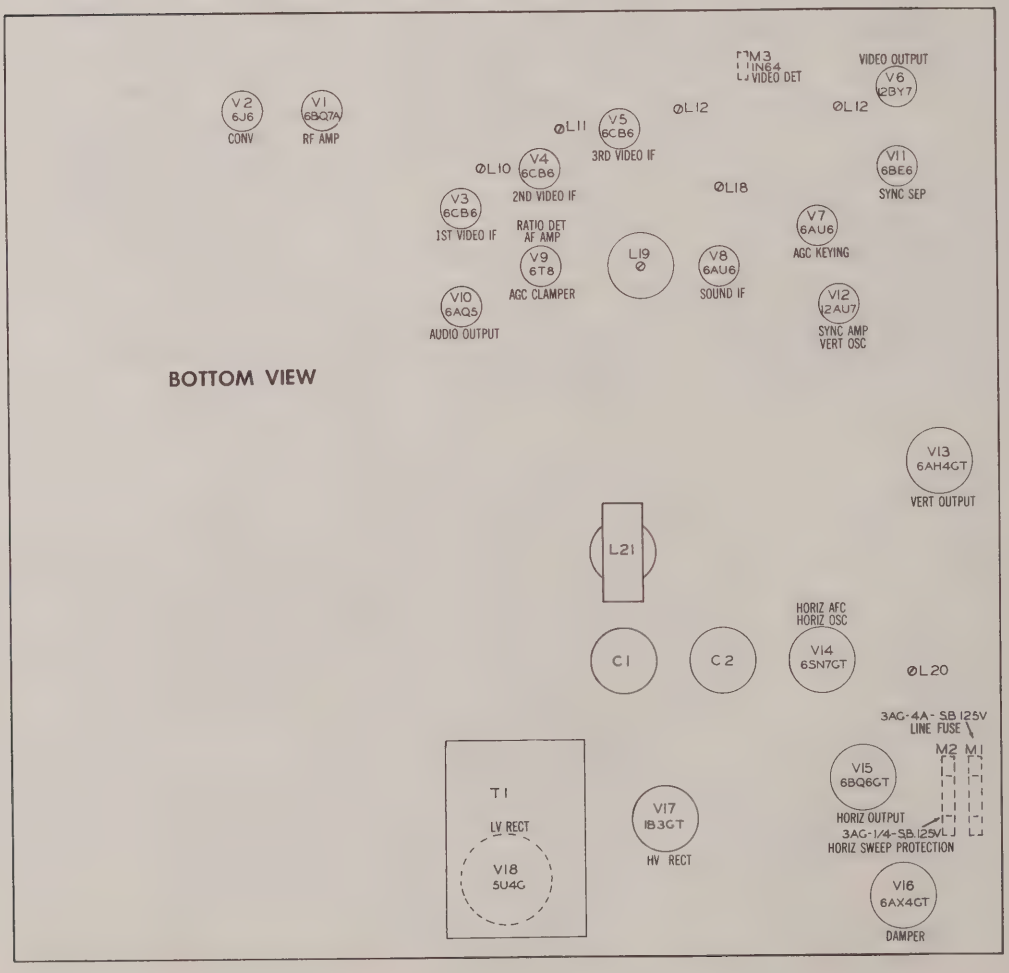


FIG. 6

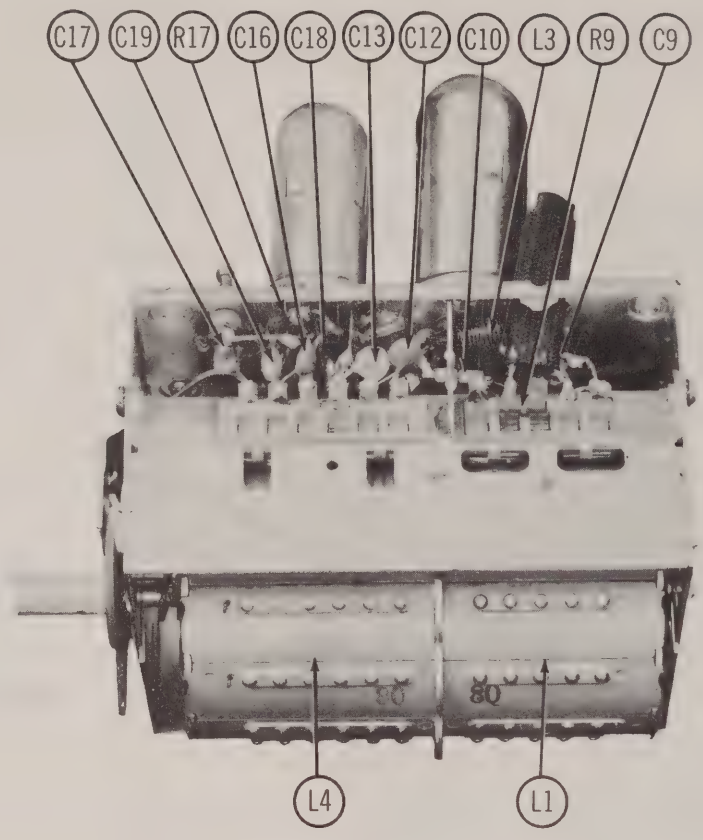
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	750KΩ	0Ω	.1Ω	0Ω	†6.7KΩ	180KΩ	INF	0Ω
V 2	6J6	■12KΩ	■100Ω	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	230KΩ	68Ω	.1Ω	0Ω	▲500Ω	▲500Ω	0Ω		
V 4	6CB6	70KΩ	▲47Ω	†100KΩ	†100KΩ	†600Ω	†600Ω	70KΩ		
V 5	6CB6	.4Ω	180Ω	.1Ω	0Ω	■100Ω	■100Ω	0Ω		
V 6	12BY7	200Ω	3.3KΩ	200Ω	0Ω	0Ω	.1Ω	†21KΩ	■8.2KΩ	200Ω
V 7	6AU6	†50KΩ	†15.5KΩ	†100KΩ	†100KΩ	320KΩ	†500Ω	†15.5KΩ		
V 8	6AU6	1Ω	0Ω	.1Ω	0Ω	■1KΩ	■1KΩ	120Ω		
V 9	6T8	INF	22KΩ	INF	0Ω	.1Ω	700KΩ	0Ω	10Meg	■470KΩ
V 10	6AQ5	360KΩ	†17KΩ	†100KΩ	†100KΩ	†1.5KΩ	†700Ω	360KΩ		
V 11	6BE6	2.7Meg	0Ω	.1Ω	0Ω	†40KΩ	■82KΩ	2.2Meg		
V 12	12AU7	◓900KΩ	2.5Meg	0Ω	0Ω	0Ω	†9.5KΩ	10Meg	†10KΩ	.1Ω
V 13	6AH4GT	2.2Meg	0Ω	†100KΩ	2.2Meg	†850Ω	†100KΩ	.1Ω	4KΩ	
V 14	6SN7GT	1.6Meg	†50KΩ	430KΩ	480KΩ	†68KΩ	0Ω	.1Ω	0Ω	
V 15	6BQ6GT	†500Ω	.1Ω	INF	†12KΩ	470KΩ	†68KΩ	0Ω	100Ω	Top Cap ◓17Ω
V 16	6AX4GT	INF	†1.2KΩ	550KΩ	100Ω	†600Ω	†500Ω	†100KΩ	†100KΩ	
V 17	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ◓412Ω
V 18	5U4G	INF	30KΩ	INF	36Ω	INF	38Ω	INF	30KΩ	
V 19	21YP4A	†100KΩ	†1.1Meg	Pin 6 ◓33KΩ	Pin 10 ◓33KΩ	Pin 11 †120KΩ	Pin 12 †100KΩ			

† MEASURED FROM PIN 8 OF V18.
▲ MEASURED FROM PIN 7 OF V4.
◓ MEASURED FROM PIN 3 OF V16.
■ MEASURED FROM 125V LINE.

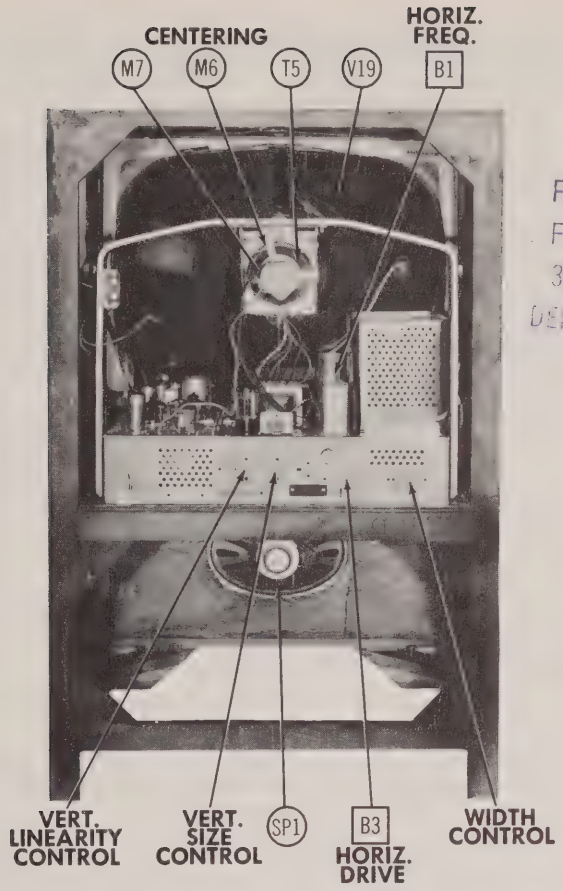


TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE

RF TUNER-BOTTOM VIEW



PROPERTY OF
F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal frequency slug (B1) and the stabilizing coil slug (B2) all the way out.
2. Short together terminals "C" & "D" of (L20).
3. Turn the horizontal drive trimmer (B3) one-half turn from its fully clockwise position. Set the horizontal hold control to its fully clockwise position.
4. Adjust B1 until picture locks in horizontally.
5. Remove short from terminals "C" & "D" of L20. If picture loses sync with short removed, adjust B2 until picture locks in sync. By turning the horizontal hold control over its full range, the picture should stay locked in sync. If picture loses sync adjust B2.
6. Connect the vertical input lead of an oscilloscope to terminal "C" of L20. The broad and narrow peaks should be of equal amplitude as shown in Fig. 7. SLIGHTLY retouch B2 if Fig. 7. peaks are not equal.
7. With horizontal hold set at or near its mid-range position, picture should remain in sync. while switching off channel and back again.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the tube.

Adjust the width control (R8) for a picture slightly wider than necessary to fill the picture mask horizontally.

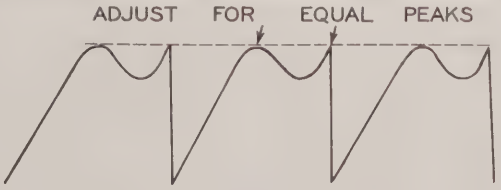


FIG. 7

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16 and V18. Check adjustments B3 and R8. Check T3, T5A, R100, R101, C79, C78 and other associated components.

DRIVE LINES

Check by substitution V15 and V16. Check adjustment B3. Check R100, R101, R106, C79, C81 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V15 and V16. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V14, V15 and V16. Check C73 and C74 for open. Check L20, C77, C76, R89, R86 and other associated components.

XMAS TREE EFFECT

Check by substitution V14, V15 and V16. Check T3 and T5 for internal arcing. Check C69, C70, C71, C77, L20, R88 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V12 and V13. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R6, R78, C2B and other associated components.	Check T2, C62, C5, C66, R79, R74, R7, R72 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V12 and V13. Check vertical size and vertical linearity controls for proper operation. Check T4, R79, R74 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V12 and V13. Check R79, R74, R7, C5, T2 and other associated components.

COMPRESSED AT TOP

Check by substitution V12 and V13. Check R78, R6, C2B, C66, T4 and other associated components.

FOLDS

Check by substitution V12 and V13. Check C63, C66, R75, T4, T5B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V11 and V12. Check C59, C58, C60, R68, R65, R64, R67, R69 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check vertical integrator network. Check T2, C62, R73, R72, R4 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V14. Check C68, C71, C75, C77, L20, R93, R94, R3 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V11, V12 and V14. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check R35, R42, R41, L17, C37, C38 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A23. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check L16, R36, R37, C38 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check video crystal detector network. Check L14, L16, C37, C38, R41, R42 and other associated components.

SMEAR

Substitute V6. Check L14, L16, R36, C38 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9 and V10. Check stages V9 and V10 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check audio detector and audio IF stages for component failure or change of value.	Check C50, C52, C53, C54, C56, R56, R59, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A22 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check M1 fuse. Check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V18. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V18. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Stewart-Warner PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BQ7A	6BQ7A	9AJ	6BQ7 or 6BZ7 used in some sets.
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	12BY7	12BY7	9BF	
V7	AGC Keyer	6AU6	6AU6	7BK	
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector-AF Amp.-AGC Clamper	6T8	6T8	9E	
V10	Audio Output	6AQ5	6AQ5	7BZ	
V11	Sync Sep.	6BE6	6BE6	7CH	
V12	Sync Amp.-Vert. Osc.	12AU7	12AU7	9A	
V13	Vert. Output	6AH4GT	6AH4GT	8EL	
V14	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6AX4GT	6AX4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Stewart-Warner PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19A	21YP4A	21YP4A	21YP4A	21YP4A	21YP4A	12L	① Circuit changes necessary
B	21YP4	21YP4	21YP4	21YP4 21AFP4 ①	21YP4	12L 12M	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Stewart-Warner PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	W506072			FP377	TM-T40-450	T-170	
B	■40	450							
C	▲40	450							
C2A	▲80	250	W509002			FP229.8	TM-3057	T-720	
B	■100	50							
C3	40	300	160095			TC78	TD-40-350	FM-4540	
C4	4	450	504719			TC70	TD-4-450	FM-4504	
C5	4	450	504719			TC70	TD-4-450	FM-4504	
C6	10	150	505714			TC42	TD-10-105	FM-1512	
C7	3-9		509064	829-10					
C8	800			MFT-1000					
C9	3		513453	TCZ-3	NP0K-030	ZT-5533			
C10	800			MFT-1000					
C11	.5-3		507968	829-3	3115-01-0R5	CT565A			
C12	1.5		520720	TCZ-1.5	NP0K-1R5	ZT-5515			
C13	47		520719	D6-470	801-470	UC-5447			
C14	1000		520735	DD-102	801-001	DC-521			
C15	800			MFT-1000					
C16	47		520719	D6-470	801-470	UC-5447			
C17	.5-3		507968	829-3	3115-01-0R5	CT565A			
C18	10		520718	TCZ-10	NP0K-100	ZT-541			
C19	5		520717						
C20	1000		520735	DD-102	801-001	DC-521			
C21	6.8		520716	TCZ-6.8	NP0K-6R8	ZT-5568			
C22	120		513029	D6-121	GP2K-121	UC-5312			
C23	800			MFT-1000					
C24	800			MFT-1000					
C25	5000		513013	DD-502	801-005	DC-525		C-1250	
C26	5000		513013	DD-502	801-005	DC-525		C-1250	
C27	5000		513013	DD-502	801-005	DC-525		C-1250	
C28	5000		513013	DD-502	801-005	DC-525		C-1250	
C29	5000		513013	DD-502	801-005	DC-525		C-1250	
C30	5000		513013	DD-502	801-005	DC-525		C-1250	
C31	5000		513013	DD-502	801-005	DC-525		C-1250	
C32	5000		513013	DD-502	801-005	DC-525		C-1250	
C33	5000		513013	DD-502	801-005	DC-525		C-1250	
C34	5000		513013	DD-502	801-005	DC-525		C-1250	
C35	5		513432	TCZ-4.7	NP0K-050	ZT-555		KR-1550	
C36	.22	200	512238			PT4022	IMP4-P22	3304022	
C37	47		513438	D6-470	GP1K-470	UC-5447		K-1447	
C38	.1	200	512216	DF-104		PT401	IMP2-P1	330201	
C39	220	1000	513032	DD16-221	1R5KV-221	DC-30322		K-2322	
C40	.47	200	512239			PT4047	IMP2-P47	3302047	
C41	.22	200	512238			PT4022	IMP4-P22	3304022	
C42	5000		513013	DD-502	801-005	DC-525		C-1250	
C43	5000		513013	DD-502	801-005	DC-525		C-1250	
C44	2.2		513001						
C45	5000		513013	DD-502	801-005	DC-525		C-1250	
C46	5000		513013	DD-502	801-005	DC-525		C-1250	
C47	1500		513010	D6-152	GP2L-152	UC-5215		C-1215	
C48	1500		513010	D6-152	GP2L-152	UC-5215		C-1215	
C49	5000		513013	DD-502	801-005	DC-525		C-1250	
C50	.047	200	512235	DF-503		PT4147	IMP2-S47	3302147	
C51	5000		513013	DD-502	801-005	DC-525	IMP6-D5	C-1250	
C52	5000		513013	DD-502	801-005	DC-525	IMP6-D5	C-1250	
C53	270		513006	D6-271	GP2K-271	UC-5327		K-1327	
C54	.01	600	512205	D6-103	GP2-333-103	PT611	IMP6-S1	330611	
C55	.01	400	512204	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C56	5000		513013	DD-502	801-005	DC-525	IMP6-D5	C-1250	
C57	.047	200	512235	DF-503		PT4147	IMP2-S47	3302147	
C58	5000		513013	DD-502	801-005	DC-525	IMP6-D5	C-1250	
C59	.47	200	512239			PT4047	IMP2-P47	3302047	
C60	.01	400	512205	D6-103	GP2-333-103	PT411	IMP4-S1	330411	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CAPACITORS (cont)

ITEM No.	RATING CAP	VOLT	Stewart-Warner PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
				REPLACEMENT DATA					
C61A	10000			CD-103	C 811-01	DC-521	DMP5-B1	330611	
B	2000		*508063	†DPC-200	† 1405-01	DC-533	DMP5-D3	C-1230	
C	5000					DC-535	DMP5-D5	C-1250	
D	5000					DC-535	DMP5-D5	C-1250	
C62	4700	1000	512533					CR-1247	
C63	047	200	512236		DF-503		PT4147	DMP3-647	3302147
C64	033	200	512210				PT4133	DMP6-S3	3306133
C65	.1	200	512216		DF-104		PT401	DMP3-P1	330201
C66	1	600	512218		DY-104		PT601	DMP6-P1	330601
C67	047	200	512235		DF-503		PT4147	DMP3-647	3302147
C68	100	500	512502				MCE235		KR-1310
C69	47		513030		DS-470	GP1K-470	UC-5447		K-1447
C70	47		513030		DS-470	GP1K-470	UC-5447		K-1447
C71	.0022	600	512232		DS-222	GP3-333-473	PT4322	DMP6-D23	3306322
C72	047	200	512235		DF-503		PT4147	DMP3-647	3302147
C73	47	200	512239				PT4067	DMP3-P47	3303047
C74	022	400	512233				PT4123	DMP4-423	3304122
C75	047	400	512236		DF-503		PT4147	DMP4-647	3304147
C76	200		512550		D5-201	GP2K-201	UC-533		K-1320
C77	01	400	512231		D5-103	GP3-333-403	PT401	DMP4-S1	330411
C78	820	500	512547						KR-1382
C79	1000		513009		D5-102	GP3L-103	UC-531	DMP6-D1	K-1310
C80	270		513006		D5-271	GP2K-271	UC-5337		K-1327
C81	.22	200	512238				PT4023	DMP4-P23	3304022
C82	1	600	512218		DF-104		PT601	DMP6-P1	330601
C83	100	500	512502				MCE235		KR-1310
C84	047	200	512233		DF-503		PT4147	DMP3-647	3302147
C85	047	600	512237		DF-503		PT4147	DMP6-647	3306147
C86	.022	600	512234				PT6123	DMP6-S23	3306122
C87	.022	600	512234				PT6123	DMP6-S23	3306122
C88	56	1500	513027						
C89	500	20000	520990		TV3-502	413	HV20035A		
C90	5000		513003		DD-502	801-005	DC-535		C-1250

* Items C61A, C61C, C61D, R71A, R71B and R71C are combined in one unit.
† To replace original Mfg'r's unit, install 10000MMF unit in series with input lead of C-R unit.

CONTROLS

ITEM No	RATING RESISTANCE	WATTS	Stewart-Warner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No	INSTALLATION NOTES
					REPLACEMENT DATA			
R1A	100KΩ		521060	*QJ-471	RTV-438	F1-31	UP151,	Brightness (Panel)
B	1MEG					R1-57	UR18725	Volume-tapped @200KΩ(rear)
C	Switch					KB-1	UB-28	Attach to R1B
R2A	500KΩ		520746	QU-123	A47-500E-S	AB-59	U-50	Tone
B	Shaft		Not Req.	Not Req.	AK-4	Not Req.	AK-4	Attach to R2A
R3A	50KΩ		521069	QU-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KB6-3	AK-4	Not Req.	Attach to R3A
R4A	1MEg		521058	QU-137	A47-1MEg-S	AB-59	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KB6-3	AK-4	Not Req.	Attach to R4A
R5A	500Ω		521057	QU-103	A47-500-S	AB-4	B500L	Power Booster
B	Shaft		Not Req.	Not Req.	KB6-3	AK-4	DB-36	Attach to R5A
R6A	5000Ω		520945	QH-114	A47-5000-S	AB-13	HU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R6A
R7A	2.5 MEg		520944	QU-239	A47-2.5Meg-S	AB-83	SU-565	Vert. Size
B	Shaft		Not Req.	Not Req.	FK8-1/4	AK-1	Not Req.	Attach to R7A
R8A	400Ω	4	520936	4WK-400	A10-400	SVP-091	M400PE	Width
B	Shaft		Not Req.	Not Req.	FK8-1/4	Not Req.	Not Req.	Attach to R8A

* CONCENTRIC† EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS : R1-128 & P1-133 (Front)
R13-137X & R1-316 (Rear)
SWITCH T6-1

† UNIVERSAL REPLACEMENT (MALLORY EXACT DUPLICATE PART #U614SR).

RESISTORS

ITEM No.	RATING OHMS	WATT	Stewart-Warner PART No	IRC PART No.	NOTES
			REPLACEMENT DATA		
R9	15KΩ	½	510157	BTS-15K	
R10	47KΩ	½	510167	BTS-47K	
R11	100KΩ	½	510172	BTS-100K	
R12	100KΩ 5%	½	510774	BTS-100K 5%	
R13	100KΩ 5%	½	510751	BTS-100K 5%	
R14	150Ω	½	510139	BTS-150	
R15	10KΩ	½	510154	BTS-10K	
R16	220KΩ	½	510179	BTS-220K	
R17	10KΩ	½	510154	BTS-10K	
R18	15KΩ	½	510157	BTS-15K	
R19	10KΩ	½	510154	BTS-10K	
R20	68Ω	½	510118	BTS-68	
R21	470Ω	½	510130	BTS-470	
R22	6800Ω	½	510151	BTS-6800	
R23	100KΩ	½	510172	BTS-100K	
R24	120KΩ	½	510174	BTS-120K	
R25	100Ω	½	510118	BTS-100	
R26	4.700Ω	2	510148	BTS-4700	
R27	5600Ω	½	510150	BTS-5600	
R28	47Ω	½	510118	BTS-47	
R29	100Ω	½	510118	BTS-100	
R30	5600Ω	½	510150	BTS-5600	
R31	180Ω	½	510133	BTS-180	
R32	100Ω	½	510118	BTS-100	
R33	3300Ω	½	510145	BTS-3300	
R34	47KΩ	½	510166	BTS-47K	
R35	8200Ω	½	510153	BTS-8200	
R36	8200Ω	½	510153	BTS-8200	
R37	120KΩ	½	510174	BTS-120K	
R38	560Ω	½	510186	BTS-560	
R39	1MEg	½	510190	BTS-1MEg	
R40	220KΩ	½	510178	BTS-220K	
R41	390Ω	½	510147	BTS-390Ω	
R42	1.2MEg	½	510777	BTS-1.2Meg 5%	
R73	220KΩ	½	510178	BTS-220K	
R74	470KΩ	½	510184	BTS-470K	
R75	820Ω	½	510153	BTS-8200	
R76	47KΩ	½	510166	BTS-47K	
R77	2.2Meg	½	510193	BTS-2.2Meg	
R78	390Ω	½	510139	BTS-390	
R79	330KΩ	½	510181	BTS-330K	
R80	560Ω	½	510153	BTS-560	
R81	560Ω	½	510153	BTS-560	
R82	330KΩ	½	510181	BTS-330K	
R83	820KΩ	½	510189	BTS-820K	
R84	100KΩ	½	510172	BTS-100K	
R85	820KΩ	½	510189	BTS-820K	
R86	4700Ω	½	510148	BTS-4700	
R87	150KΩ	½	510175	BTS-150K	
R88	10KΩ	½	510154	BTS-10K	
R89	18KΩ	½	510159	BTS-18K	
R90	220KΩ	½	510178	BTS-220K	
R91	1Meg	½	510190	BTS-1Meg	
R92	150KΩ	½	510178	BTS-150K	
R93	68KΩ	½	510169	BTS-68K	
R94	68KΩ	½	510169	BTS-68K	
R95	68KΩ	½	510169	BTA-68K	
R96	47MΩ	½	510184	BTS-470K	
R97	100Ω	2	510318	BTB-100	
R98	150KΩ	½	510175	BTS-150K	
R99	56KΩ	½	510168	BTS-56K	
R100	47KΩ	½	510166	BTS-47K	
R101	12KΩ	½	510156	BTS-12K	
R102	1Meg	½	510190	BTS-1Meg	
R103	33KΩ	½	510163	BTS-33K	
R104	68KΩ	½	510154	BTS-680	
R105	3.3Ω		510175		
R106	1Meg	½	510190	BTS-1Meg	
R107	100KΩ	½	510172	BTS-100K	
R108	50Ω	5	510782		
R109	600Ω	10	510741		
R110	400Ω	10	510779		
R111	1500Ω	½	510129	BTS-1500	
R112	15KΩ	2	510157	BTS-15K	
R113	150KΩ	½	510175	BTS-150K	

Note 1: Not used in some versions.
* Items R71A, R71B, R71C, C61A, C61B, C61C and C61D are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	Stewart-Warner PART No.	Stancor PART No.	REPLACEMENT DATA Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @1.47A	660VCT @.180ADC	5VAC @ 3A	520951						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @3.1A	12.6VCT @3.3A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	Stewart-Warner PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
					REPLACEMENT DATA				
T2	Vert. Osc. Trans.	520980	S6702	A-3003	209T1 ①	V405	A-8125	24A87 ①	A-97X
T3	Horiz. Output Trans.	521066	FB41* ①	HVO-9* ①	232T1* ①	X060*①	A-8252* ①	F1Y-24*①	D-35* ①
T4	Vert. Output Trans.	520975 ②	Z1804 ②	A-3037 ②	222T1 ②	V313	A-8123 ②	Z6552 ②	A-102X ②
T5A	Yoke-Horiz.(13MH)	520943 ③	DF602-④⑤	MDJ-T3-⑤	210Z6-5 ③	Y70F14/43 ③	DY-9A ③	Y-7-5 ③	Y-17-1 ③
B	Vert. (37MH)					④ ⑤		⑤	⑤

① Drill new mounting hole(s).
② Includes connectors for deflection yoke leads.
③ Includes leads, connectors, R80 and R81.
④ Use original yoke cover and centering device.
⑤ Use original horiz. yoke damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merd Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead	HV Rect. Plate Lead
7	9	9	10	9	9	9	10
6	8	7	8	Jumper 7 & 8	Jumper 7 & 8	7	8
5	5	5	6	5 or 4	5	5	6
3	4	7	5	T	4	T	5
2	T or 3	3	Jumper 2 & 3	3	3	3	Jumper 2 & 3
Special Series	⑥	⑥				⑥	⑦

⑥ If insufficient width connect a .005MFD 500V capacitor across terminals T and 3.
⑦ Jumper terms 9 and T.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	SEC	Stewart-Warner PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No.	NOTES
				REPLACEMENT DATA					
T6	4.3KΩ	3.3Ω	509376	A-3877	A-2930	S-3X	Z1107	22846	

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V C IMP	Stewart-Warner PART No.	JENSEN PART No.	QUAM PART No.	NOTES
					REPLACEMENT DATA		
SP1	6" X 9"	PM	3.3Ω	508174	ST-810 Mod. P10-V	68A3	① Alternate speakers.
	4"	PM	3.3Ω	508341 ①	ST-413 Mod. P4-X	4A1	
	6"	PM	3.3Ω	508398 ①	ST-608 Mod. P6-X	6A1	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC	Stewart-Warner PART No	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
				REPLACEMENT DATA				
L1A	Ant. Coil	01OCT	0Ω	520703				Channel 2
B	Ant. Coil	01OCT	0Ω	520703				Channel 3
C	Ant. Coil	01OCT	0Ω	520704				Channel 4
E	Ant. Coil	00CT	0Ω	520705				Channel 5
E	Ant. Coil	01CT	0Ω	520706				Channel 6
F	Ant. Coil	00CT	0Ω	520707				Channel 7
G	Ant. Coil	01CT	0Ω	520708				Channel 8
H	Ant. Coil	00CT	0Ω	520709				Channel 9
I	Ant. Coil	00CT	0Ω	520710				Channel 10
J	Ant. Coil	00CT	0Ω	520711				Channel 11
K	Ant. Coil	01CT	0Ω	520712				Channel 12
L	Ant. Coil	01CT	0Ω	520713				Channel 13
L2	Fil. Choke	01CT	0Ω	520518				
L3	Shunt Coil	00CT	0Ω	520701				
L4A	RF, Mixer Grid & Osc. Coil	0Ω		520722				Channel 2
B	RF, Mixer Grid & Osc. Coil	0Ω		520723				Channel 3
C	RF, Mixer Grid & Osc. Coil	0Ω		520724				Channel 4
D	RF, Mixer Grid & Osc. Coil	0Ω		520725				Channel 5
E	RF, Mixer Grid & Osc. Coil	0Ω		520726				Channel 6
F	RF, Mixer Grid & Osc. Coil	0Ω		520727				Channel 7
G	RF, Mixer Grid & Osc. Coil	0Ω		[illegible]				Channel 8
H	RF, Mixer Grid & Osc. Coil	0Ω		[illegible]				Channel 9
I	RF, Mixer Grid & Osc. Coil	0Ω		520730				Channel 10
J	RF, Mixer Grid & Osc. Coil	0Ω		520731				Channel 11
K	RF, Mixer Grid & Osc. Coil	0Ω		520732				Channel 12
L	RF, Mixer Grid & Osc. Coil	0Ω		520733				Channel 13
L5	FIL. Choke	0Ω		530520				
L6	RF Choke	0Ω		530714				
L7	1st Video IF	.9Ω		530734				Slug core part no. 509062
L8	RF Choke	1.8Ω		520715				
L9	IF Choke	0Ω		507584	19-3008	TV-189	6175	.6 Microhenries
L10	2nd Video IF	.2Ω	.4Ω	520977	17-1083	TV-116	6249	Less core; Core part no. 507357
L11	3rd Video IF	.3Ω	.4Ω	520977	17-1084	TV-116	6250	Less core; Core part no. 507357
L12	4th Video IF	.4Ω	.6Ω	520979	17-1084	TV-116	6250	Less core; Core part no. 507357
L13	Shunt Peaking Coil	9Ω		520889	19-3180	TV-184	6180	195 Microhenries
L14	Series Peaking Coil	6.5Ω		512984	19-3125		6153	120 Microhenries
L15	4.5MC Trap	1.8Ω		509003	20-1004	TV-151	1470	
L16	Series Peaking Coil	9Ω		[illegible]	19-3180	TV-184	6180	195 Microhenries
L17	Shunt Peaking Coil	10Ω		509341	19-3250	TV-185	6181	250 Microhenries
L18	Sound IF	1Ω		509378	16-2445*	TV-113*	1470-A	
L19	Ratio Det.	2.9Ω	.7OCT	509706	17-3493	TV-115*	1498	Tertiary winding = .45Ω
L20	Horiz. Osc.	70Ω		530943	20-1402A	TV-183A	6183A	Tapped at 45Ω; Waveform winding = 45Ω; Core part no. 521068

* Use one winding only.
● Use adapter plate.
▲ Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (D CURRENT 1000 °/o)	Stewart-Warner PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
					REPLACEMENT DATA				
L21	185ADC	73Ω	3.9 Hy.	508341	C-2325 ①	C-2980①	C-17X	C5030	38C44

① Drill one new mounting hole.

FUSES

ITEM No	TYPE	RATING	Stewart-Warner PART No FUSE	Stewart-Warner PART No HOLDER	LITTELFUSE PART No FUSE	LITTELFUSE PART No HOLDER	BUSS PART No FUSE	BUSS PART No HOLDER
					REPLACEMENT DATA			
M1	3AG S/B	4A 125V	521803	520989*	313004 (4A-3AG-S/B)	357002*	MDX4	4408*
M2	3AG S/B	1/4A 125V	509713		313.250 (1/4A-3AG-S/B)		MDL 1/4	

* Two pole fuse holder. (Holds M1 and M2.)

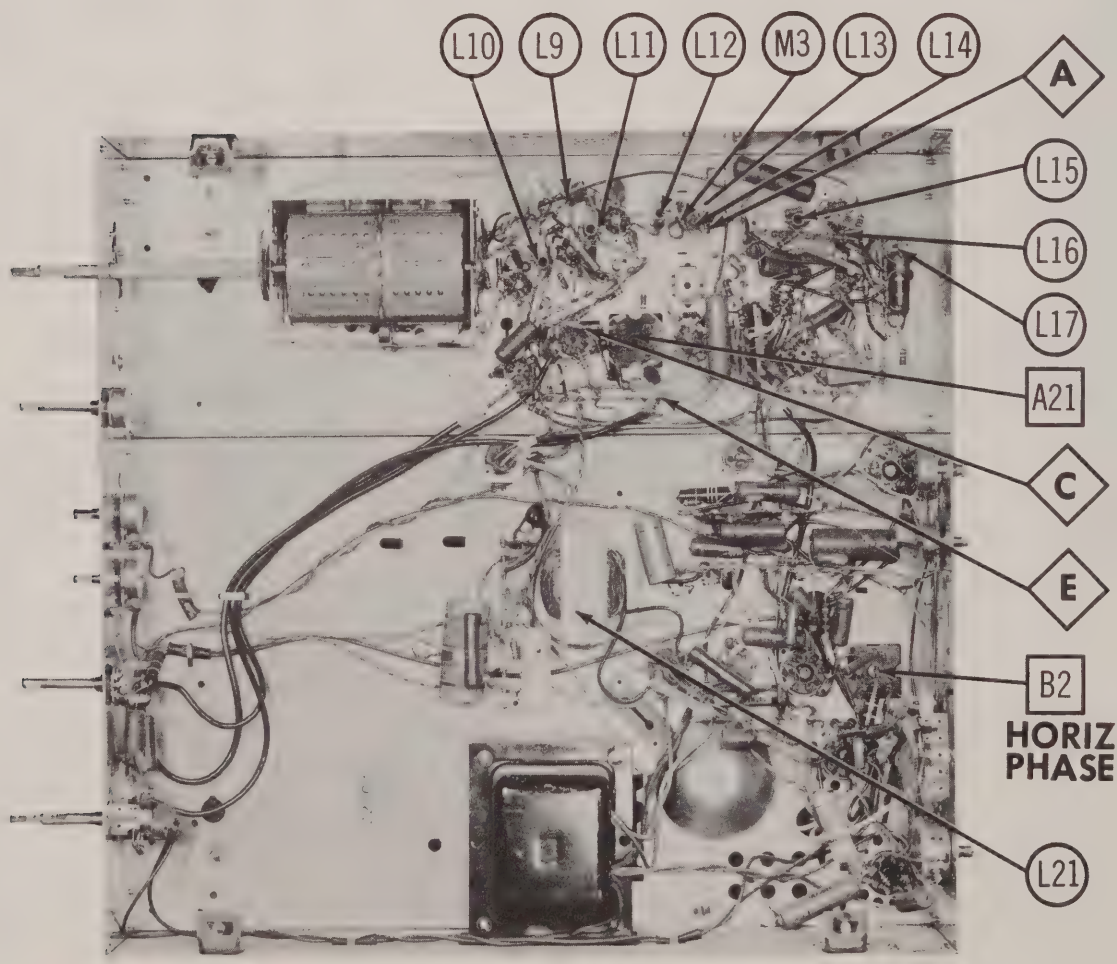
PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Stewart-Warner PART No.	SYLVANIA PART No.		
M3	1N64	509386	1N60 or 1N132		Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	Stewart-Warner PART No.	NOTES
M4	Dial Light	118921	Bayonet, #47
M5	Tuner	521068	VHF
M6	Centering Device	521267	Includes Yoke Cover
M7	Ion Trap	521183	
B3	Trimmer Cap.	508071	Horiz. Drive - 10-160MMF
	Cabinet	522641	Mahogany - Model 21C-9600K
	Cabinet	522642	Blonde - Model 21C-9600KB
	Cabinet	522251	Mahogany - Model 21C-9600L
	Cabinet	522252	Blonde - Model 21C-9600LB
	Cabinet	522361	Mahogany - Model 21C-9600M
	Cabinet	522362	Blonde - Model 21C-9600MB
	Cabinet	522261	Mahogany - Model 21C-9600P
	Cabinet	522196	Leatherette - Mahogany - Model 21T-9600A
	Cabinet	522372	Blonde - Model 21T-9600B
	Cabinet	522371	Mahogany - Model 21T-9600D
	Knob	509019	Brightness
	Knob	522354	Channel Selector
	Knob	509017	Fine Tuning
	Knob	521134	Horiz. and Vert. Hold
	Knob	509018	Off-On-Volume
	Knob	520740-D	Tone and Contrast
	Safety Glass	522332	
	Mask	522645	Models 21C-9600K, 21C-9600KB, 21C-9600L, 21C-9600LB, 21C-9600M, 21C-9600MB, 21T-9600B and 21T-9600D
	Mask	522646	Models - 21C-9600P and 21T-9600A



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

3524 MAPLE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16 and V17. Check M2 fuse. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C85, C86, C87, C82, R97, R100, R101 and other associated components.	Check C75, C76, C70, C79, R95, R93, L20 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16 and V18. Check adjustments B3 and R8. Check C79, C78, R100, R101 and other associated components.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check R100, R101, R106, C79 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

PRODUCTION CHANGES

Serial No. 100, 001	Some early production receivers did not have a serial number, however, they are identical to receivers having serial number 100, 001.
Serial No. 102, 001	TO ELIMINATE SOUND IF REGENERATION R48, 18KΩ, was added across L18 (Sound IF). In fringe areas this regeneration may appear as background hiss. SOUND IF ALIGNMENT If difficulty is encountered in aligning the sound, check and make sure R48 has been added across L18.
Serial No. 103, 901	MINIMIZE HORIZONTAL OSCILLATOR DRIFT C76 changed from a ceramic 200MMF to a mica 200MMF.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

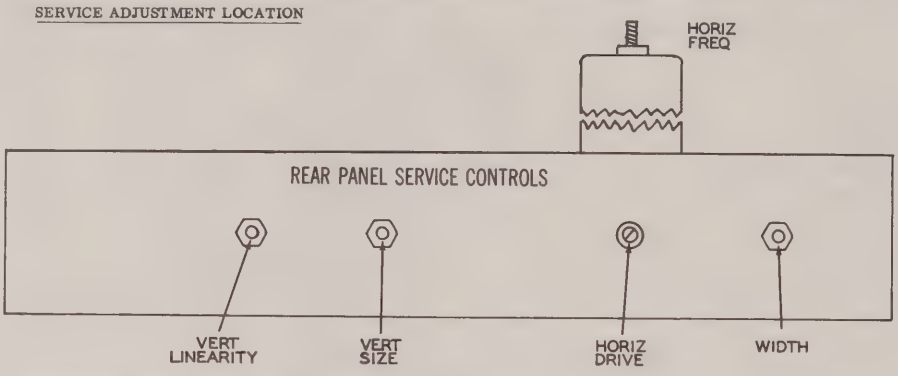
PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions.)

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the Horizontal frequency slug (L20) until picture synchronizes horizontally. (For location see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L19) located on top of the chassis. (See tube placement chart.)

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location see tube placement chart.)

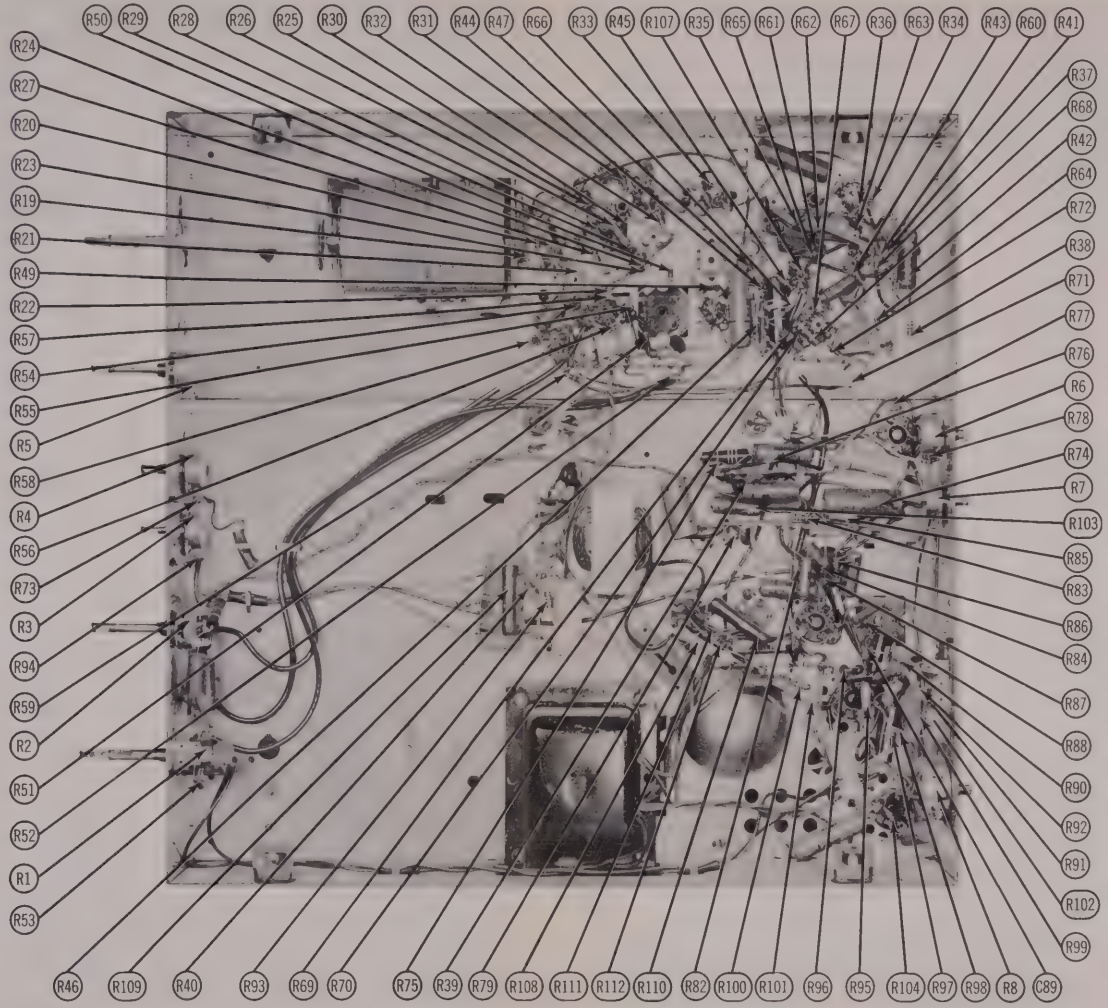
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 6 push-on type control knobs from front panel of cabinet.
2. Remove 7 wood screws and 1 metal screw. Remove rear cover.
3. Remove 2 speaker leads from speaker.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.

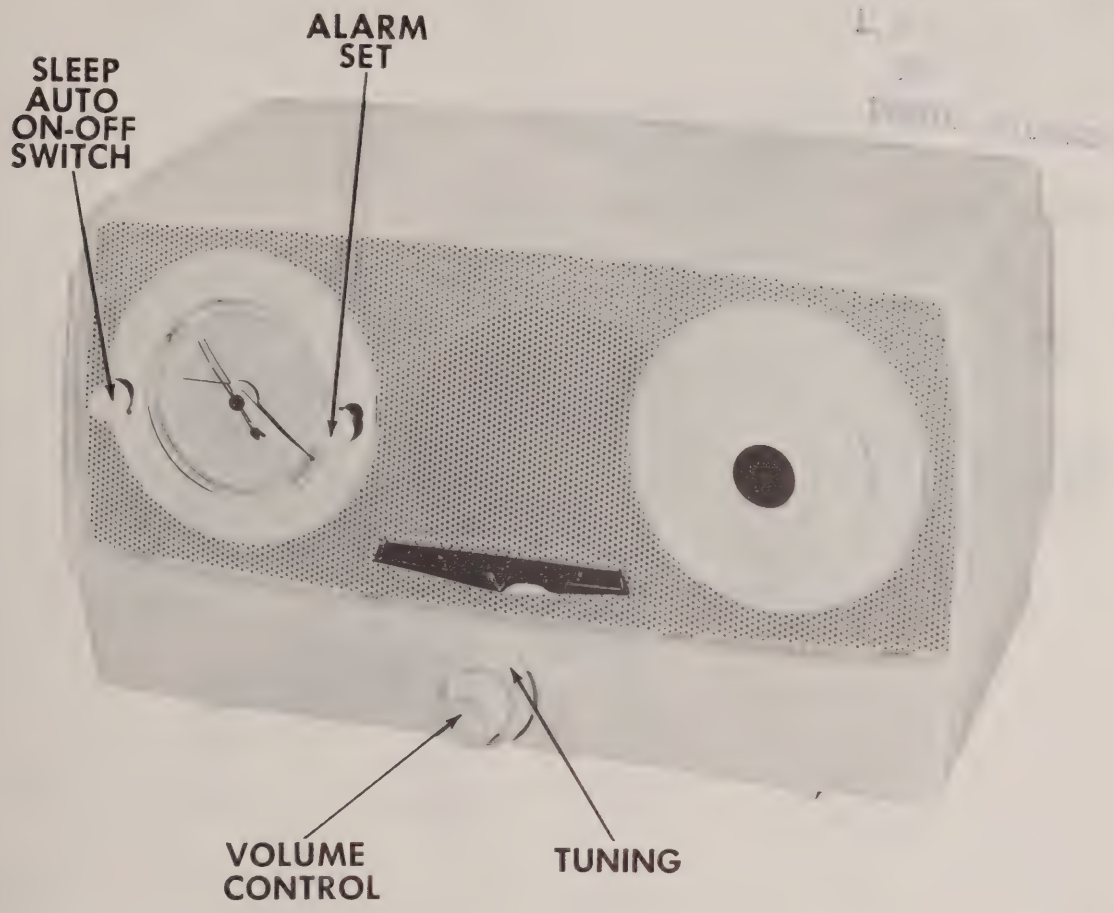
PROPERTY OF
L. F. [illegible]SHIP
3924 [illegible] ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

WESTINGHOUSE MODELS H-443T5, H-444T5, A, H-445T5, A, H-446T5, A (Ch. V-2189-4)

WESTINGHOUSE MODELS H-443T5, H-444T5, A, H-445T5, A, H-446T5, A (Ch. V-2189-4)



WESTINGHOUSE MODELS H-443T5, H-444T5, A, H-445T5, A, H-446T5, A (Ch. V-2189-4)

TRADE NAME	Westinghouse Models H-443T5, H-444T5, A, H-445T5, A, H-446T5, A (Ch. V-2189-4)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N.J.
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MFD	High side to antenna stator lug. Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1625KC	"	"	A5	"
3.	Direct	Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Westinghouse PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp	12AV6	12AV6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	V-14276-1			TCD49	TDL-D50-150	FMD-1550	Note 1
B	50	150							
C2	.05	200	RCP10W2503M	DF-503		PT415	IMP2-S5	330215	
C3A	220								
B	5000								
C	5000		♦V-10789-2	♦PC-151	♦1408-02				
D	250								
■									
C4	10000		RCP10W4103M	DD-103	811-01	DC-511	IMP8-S1	330611	
C5	.047	400	V-10157-4473M	DF-503		PT4147	IMP4-S47	3304147	
C6	.05	400	RCP10W4503M	DF-503		PT415	IMP4-S5	330415	

Note 1. Some versions use part #V-9863-3 in this application.
♦ Items C3A, C3B, C3C, C3D, C3E, R5A, R5B, R5C are combined in one unit.
When replacing items separately C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	V-9993R-14	Q13-133	A47-500K-Z	B-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	
R3	68Ω	½		BTS-68	
R4	3.3Meg	½		BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦V-10789-2	BTS-470K	
C	470KΩ	½		BTS-470K	

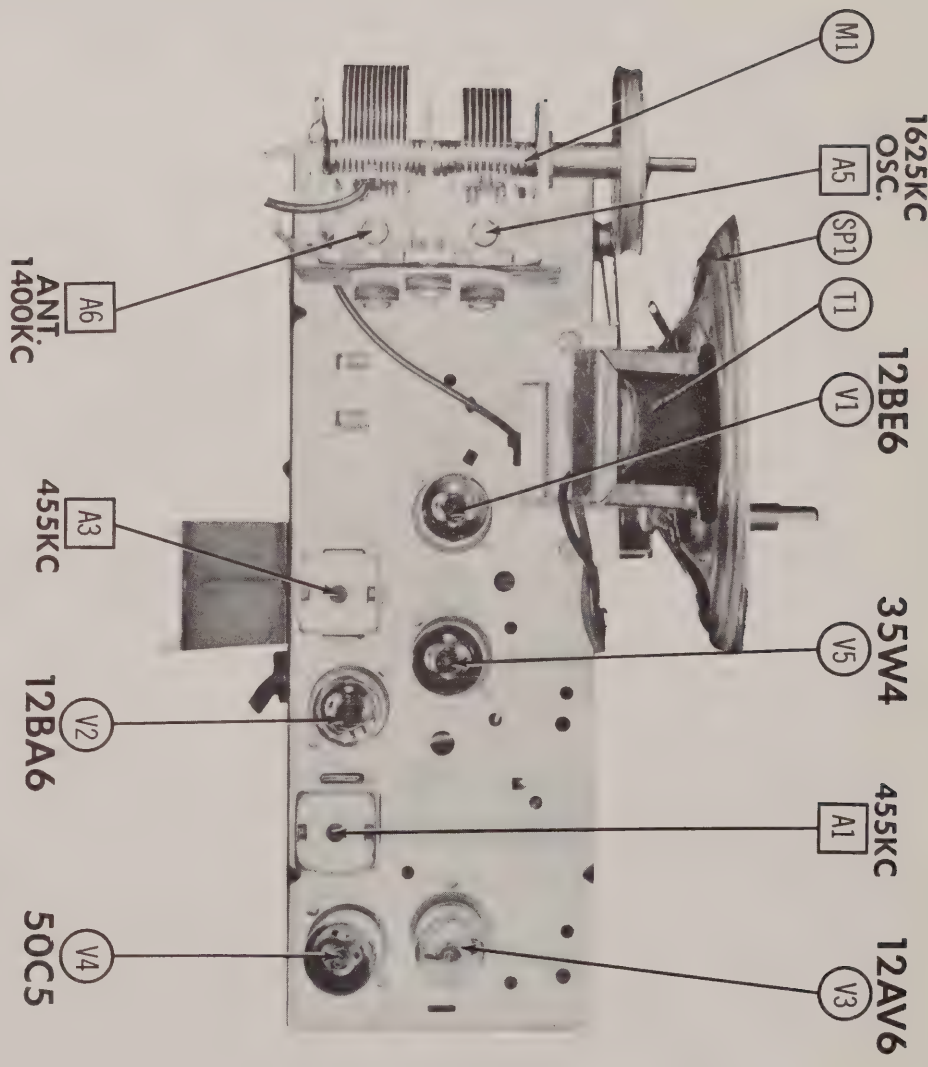
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R6	150Ω	½		BTS-150	
R7	1000Ω	1		BTA-1000	

♦ Items R5A, R5B, R5C, C3A, C3B, C3C, C3D and C3E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	3.3Ω	Part of Spkr.	A-3332	A-3025	S-12X	Z1101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	V-14405-1	ST-113 Mod. P5-X	4A07	

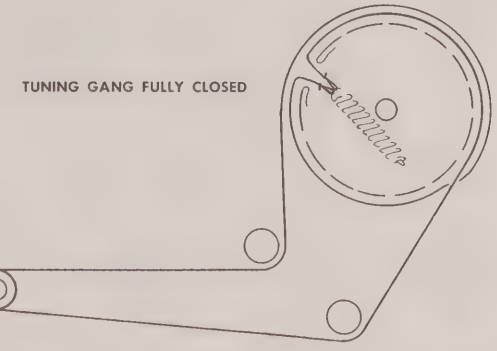
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.5Ω		V-14247-1				Includes cabinet back
L2	Osc. Coil	1Ω	12.5Ω	V-14408-2	14-1073 *		69-OSC ■	Includes R2 & C2
L3	Input IF	17Ω	17Ω	V-10945-1	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	V-10945-1	16-6758	BC-353	12-C2	

* Leads sufficient mounting support.
■ Drill mounting hole.

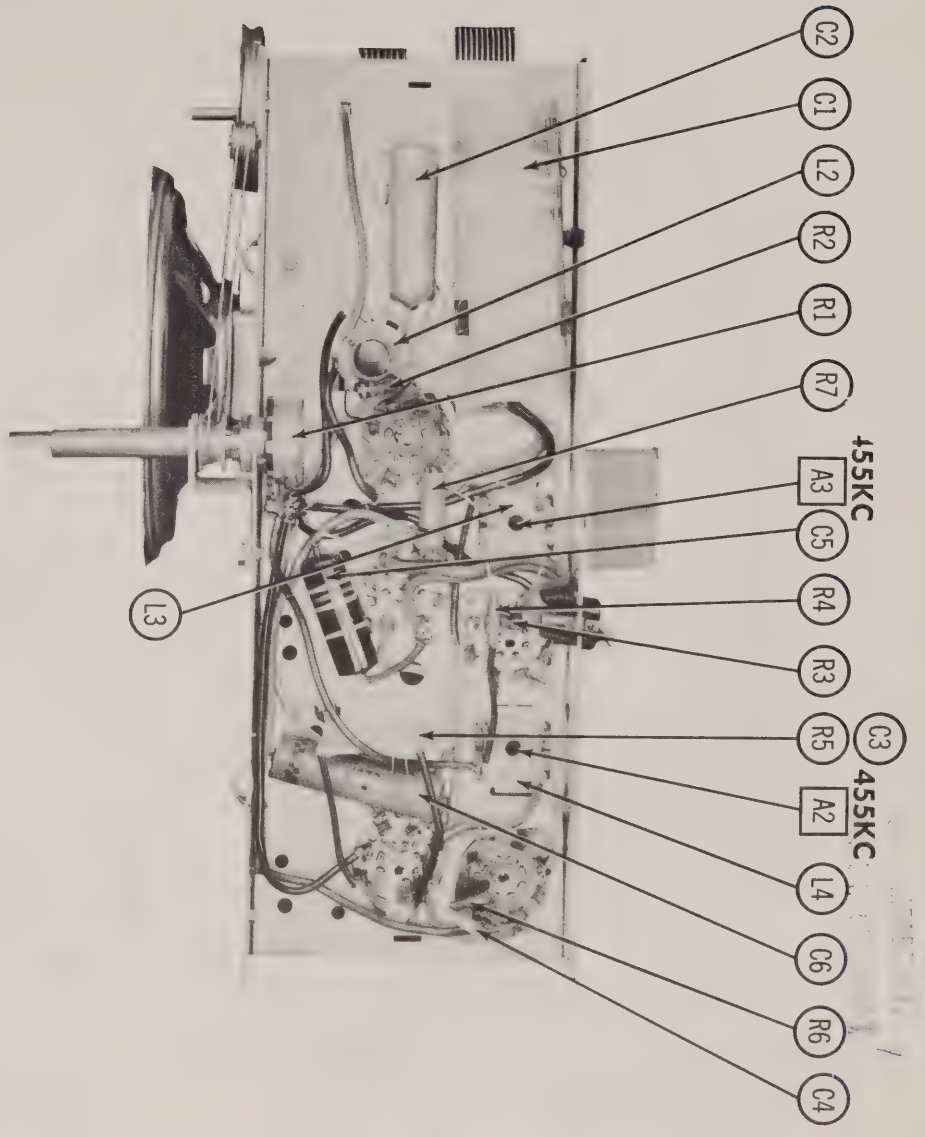
MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M1	Tuning Cap.	V-14245-2	2 Gang (17-380MMF, 15-110MMF)
	Cabinet	V-1359-2	Model H-443T5
	Cabinet	V-1359-4	Model H-445T5
	Cabinet	V-1359-5	Model H-446T5
	Cabinet	V-1359-6	Model H-444T5A
	Cabinet	V-1359-7	Model H-445T5A
	Cabinet	V-1359-8	Model H-446T5A
	Cabinet	V-1359-3	Model H-444T5
	Knob	V-9939-7	Tuning - Model H-443T5
	Knob	V-9939-9	Tuning - Models H-445T5, H-445T5A, H-444T5
	Knob	V-9939-10	Tuning - Models H-446T5, H-446T5A
	Knob	V-9939-8	Tuning - Model H-444T5A
	Knob	V-14273-1	Volume -Model H-443T5
	Knob	V-14273-3	Volume - Model H-445T5, H-445T5A
	Knob	V-14273-4	Volume - Models H-446T5, H-446T5A
	Knob	V-14273-2	Volume - Models H-444T5, H-444T5A
	Knob	V-11573-6	Clock - Model H-443T5
	Knob	V-11573-8	Clock - Models H-445T5, H-445T5A
	Knob	V-11573-9	Clock - Models H-446T5, H-446T5A
	Knob	V-11573-7	Clock - Models H-444 T5A, H-444T5



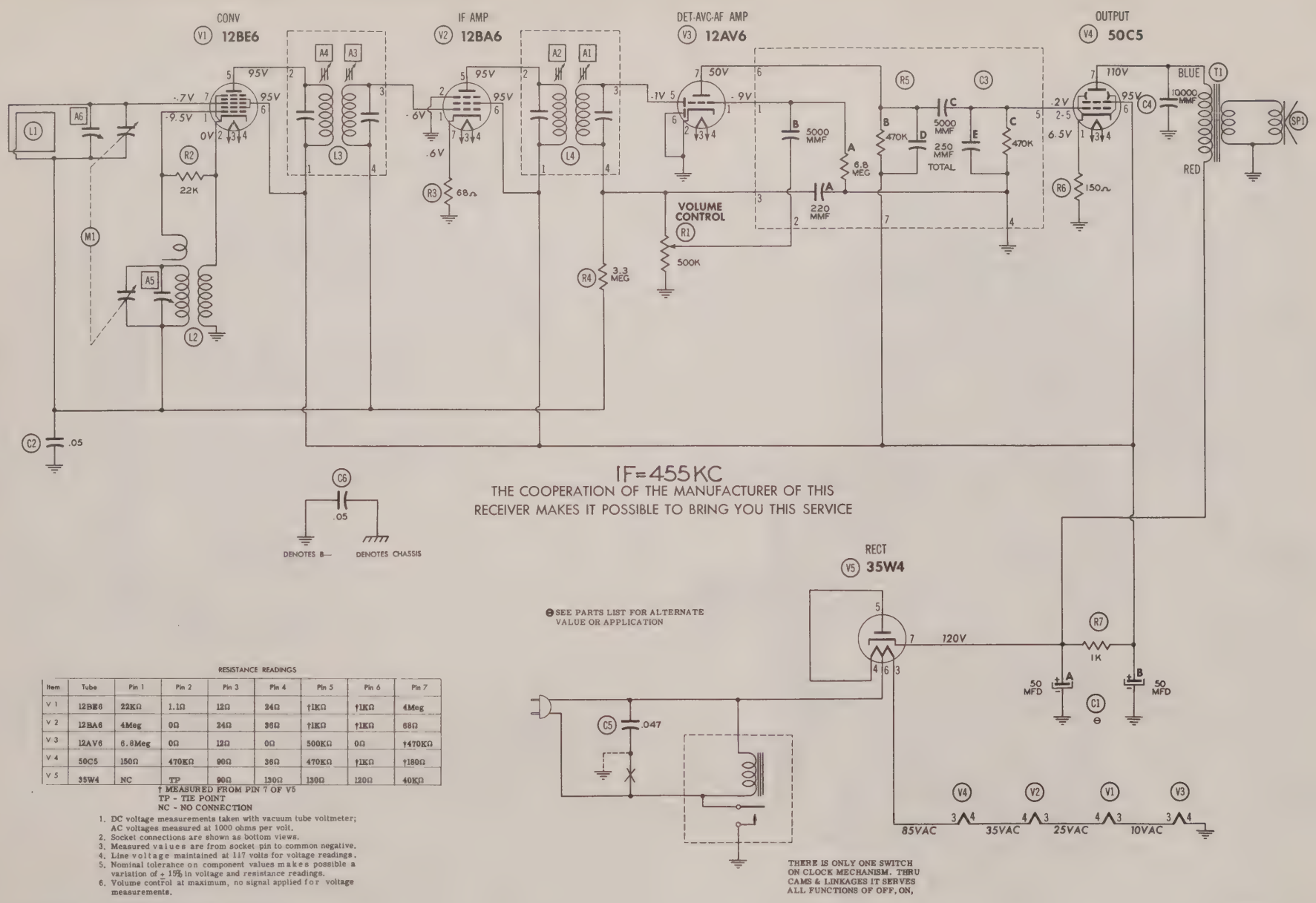
DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



PROPERTY OF
WESTINGHOUSE
MODEL H-443T5 (Ch. V-2189-4)

WESTINGHOUSE
MODEL H-443T5 (Ch. V-2189-4)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1.1Ω	12Ω	24Ω	†1KΩ	†1KΩ	4Meg
V 2	12BA6	4Meg	0Ω	24Ω	36Ω	†1KΩ	†1KΩ	68Ω
V 3	12AV6	6.8Meg	0Ω	12Ω	0Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	90Ω	36Ω	470KΩ	†1KΩ	†180Ω
V 5	35W4	NC	TP	90Ω	130Ω	130Ω	120Ω	40KΩ

† MEASURED FROM PIN 7 OF V5
TP - TIE POINT
NC - NO CONNECTION

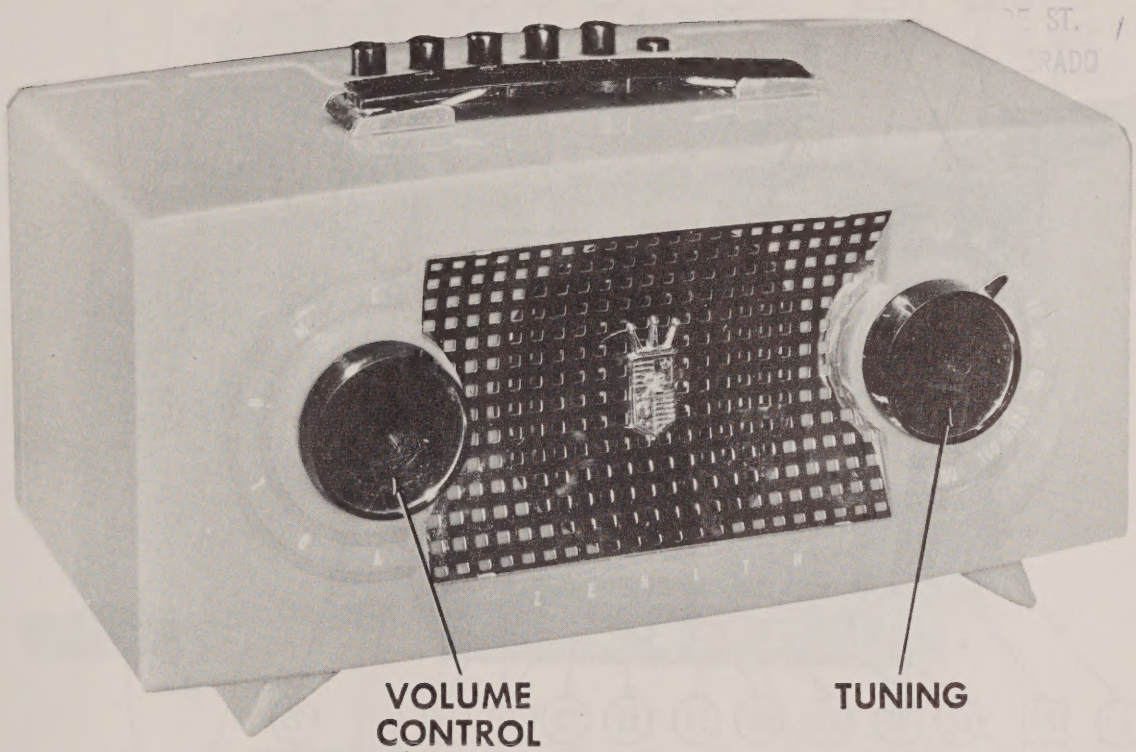
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

277-12

PROPERTY OF
L. E. BLANKENSHIP
ST.
RADO

ZENITH MODELS
R512F, R, V, W (Ch. 5R10)



ZENITH MODELS
R512F, R, V, W (Ch. 5R10)

TRADE NAME	Zenith Models R512F, R, V, W (Ch. 5R10)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det-AFC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.5MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	600KC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	Direct	Loop	1600KC	Tune to 1600KC signal.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3	"	"	1400KC	Tune to 1400KC signal.	"	A6	"

PUSHBUTTON ADJUSTMENT

When adjusting the individual automatic push buttons to specific stations, first rotate the oscillator (screw) adjustments to the desired station and then rotate the antenna (nut) adjustments for maximum volume.

PUSH BUTTON RANGES

PB#1 — 540-1000KC PB#3 — 650-1200KC
PB#2 — 600-1100KC PB#4 — 730-1340KC
PB#5 — 900-1620KC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
"Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

ZENITH
MODEL R512F (Ch. 5R10)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	60	150	22-2537			TCT3113	TDL-403020-150	FMT-310	
B	20	150							
C2	.05	200	22-829	DF-503		PT415	IMP2-S5	PT415	
C3	480	500							
C4	250		22-1666	D6-251	GP2K-251	UC-5325			
C5	250		22-1666	D6-251	GP2K-251	UC-5325			
C6	.02	200	22-1666	DF-203		PT412	IMP2-S2	330212	
C7	10000		22-3	DD-103	811-01	DC-511			
C8	470		22-6	D6-471	GP2K-471	UC-5347			
C9	10000		22-3	DD-103	811-01	DC-511			
C10	.02	400	22-1379	DF-203		PT412	IMP4-S2	330412	
C11	10000		22-3	DD-103	811-01	DC-511			
C12	.1	200	22-1418	DF-104		PT401	IMP2-P1	330201	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	63-2972	Q11-137	A47-1Meg-S	AB-69	U-53	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
D	Cover		Not Req.	Not Req.	Not Req.	KB-5	Not Req.	Attach to R1C

RESISTORS

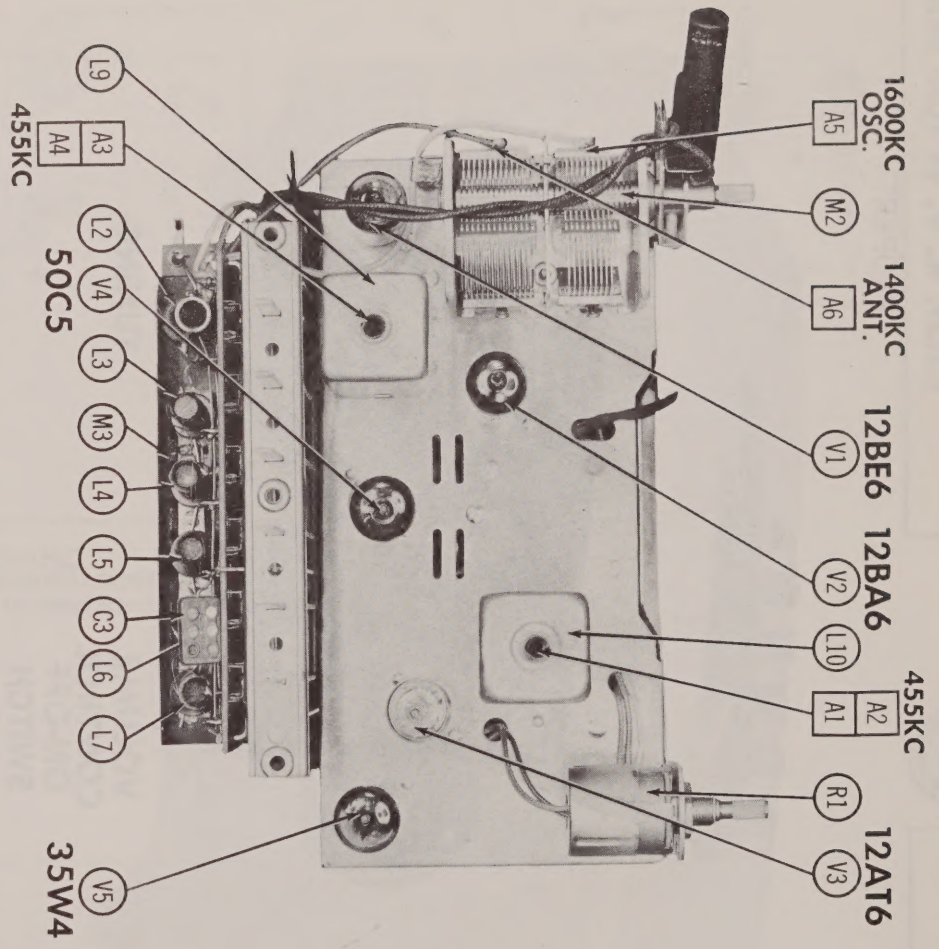
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R2	1Meg	½	63-1912	BTS-1Meg	
R3	33KΩ	½	63-1849	BTS-33K	
R4	1000Ω	½	63-1786	BTS-1000	
R5	68Ω	½	63-1737	BTS-68	
R6	2.2Meg	½	63-1926	BTS-2.2Meg	
R7	1800Ω	½	63-1796	BTS-1800	
R8	4.7Meg	½	63-1940	BTS-4.7Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R9	470KΩ	½	63-1898	BTS-470K	
R10	10KΩ	½	63-1828	BTS-10K	
R11	470KΩ	½	63-1898	BTS-470K	
R12	150Ω	½	63-1750	BTS-150	
R13	1000Ω	1	63-1574	BTA-1000	
R14	22Ω	1	63-3197		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.3KΩ	3.3Ω	95-1380	A-3332	A-3025	S-12X	Z1101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	49-761	ST-113 Mod. P4-X	4A1	

COILS (RF-IF)

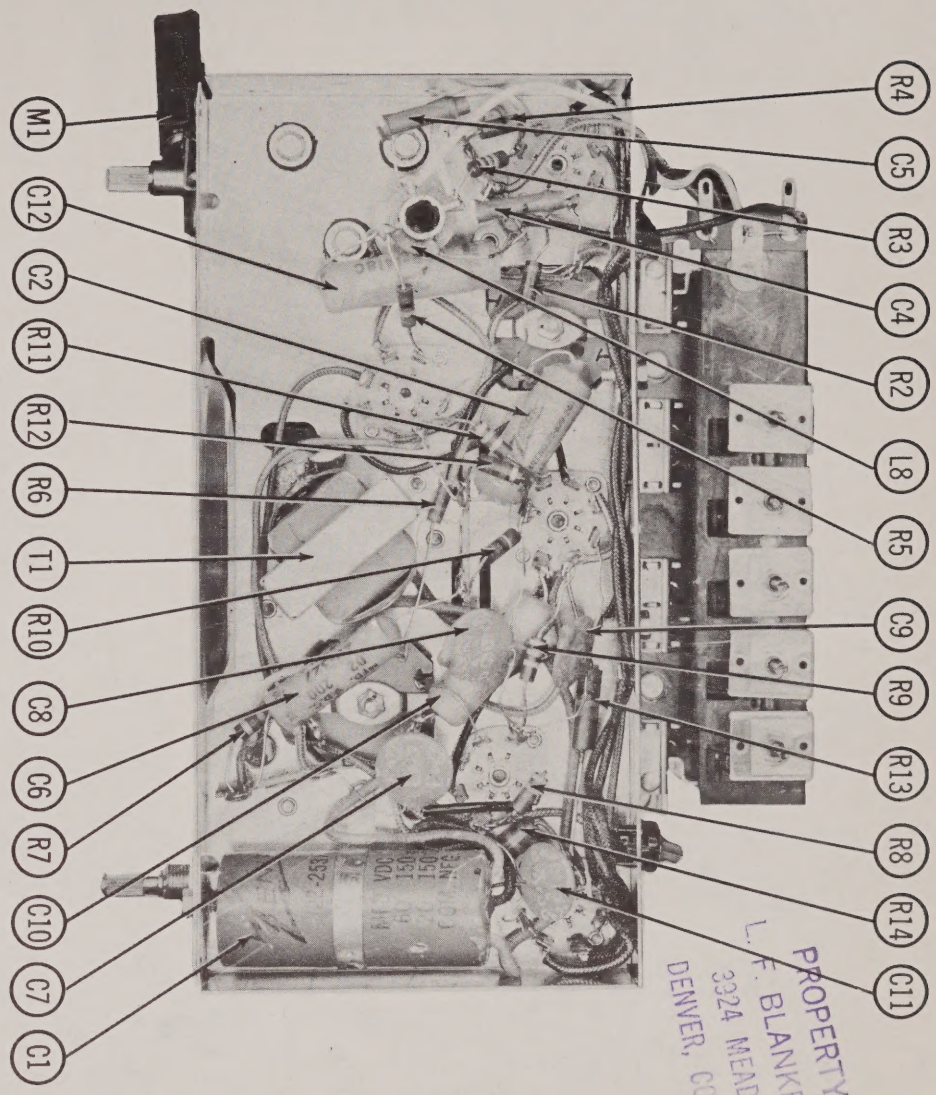
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2.2Ω		S-21521				Includes cabinet back - Note 1
L2	Osc. Shunt Coil	3.6Ω						Part of complete ass'y.
L3	Osc. Coil	1.2Ω						750-1700KC; Part of complete assembly.
L4	Osc. Coil	1.6Ω						700-1500KC; Part of complete assembly.
L5	Osc. Coil	2.6Ω						650-1400KC; Part of complete assembly.
L6	Osc. Coil	2.6Ω						600-1300KC; Part of complete assembly.
L7	Osc. Coil	2Ω						540-1200KC; Part of complete assembly.
L8	Osc. Coil	1.1Ω	10Ω	S-20231	14-1043			Core part no. 149-85
L9	Input IF	16Ω	16Ω	95-1101	16-6666	BC-368	012-C1	
L10	Output IF	16Ω	16Ω	95-1102	16-6770*	BC-355*	12-C6*	

* Use adaptor plate and cut out center spade bolt mounting support.
Note 1: Model R512F uses part no. S-21519, model R512W uses part no. S-21520 and model R512R uses part no. S-21430.

MISCELLANEOUS

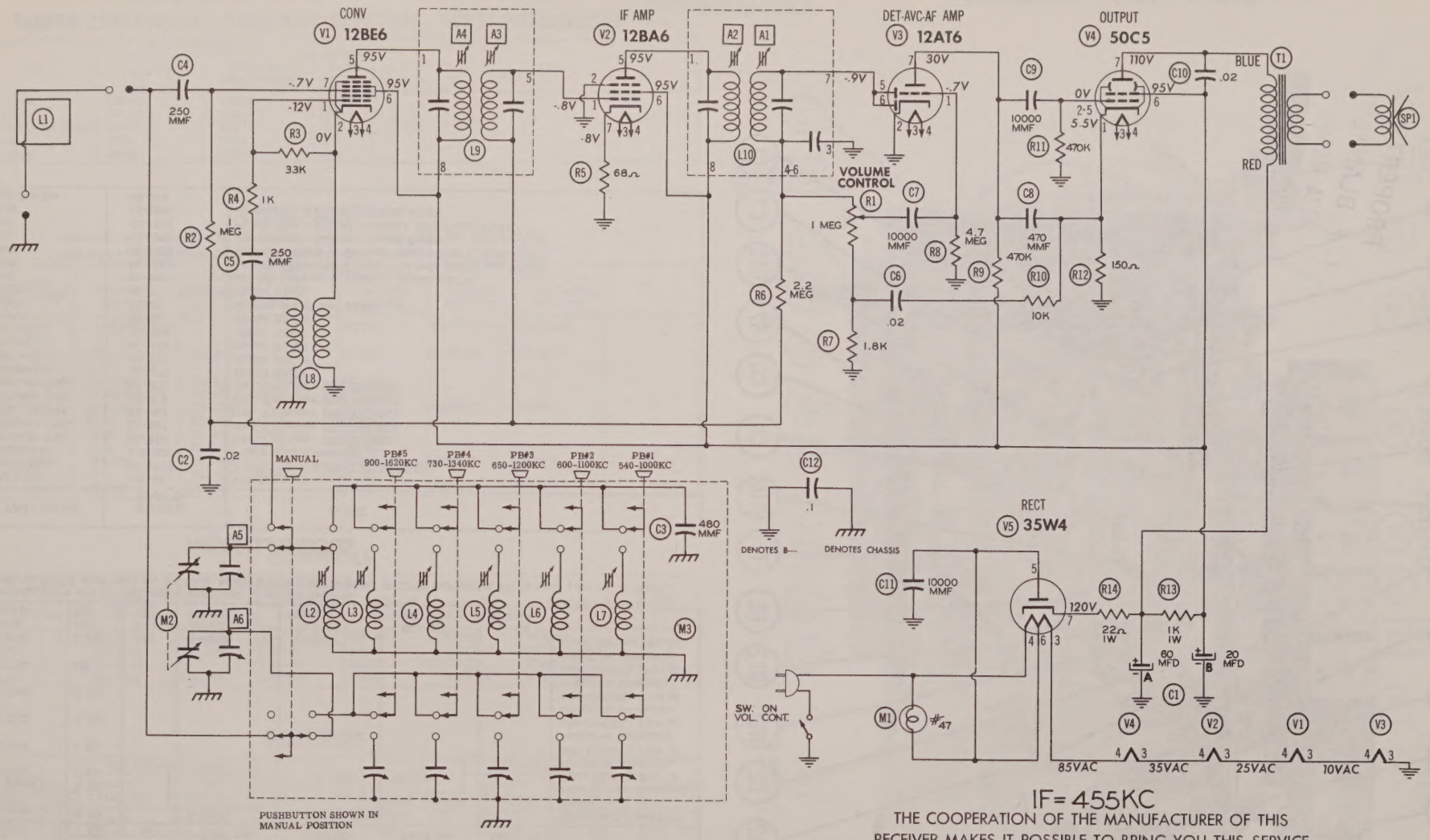
ITEM No.	PART NAME	ZENITH PART No.	NOTES
M1	Dial Light	100-67	#47, Bayonet
M2	Tuning Cap.	22-2568	2 Gang (16-455MMF; 22-185MMF)
M3	Tuning Unit.	S-21395	Pushbutton Assembly
	Trimmer Cap.	22-846	Osc. Trimmer (750-1700KC)
	Trimmer Cap.	22-847	Osc. Trimmer (700-1500KC)
	Trimmer Cap.	22-848	Osc. Trimmer (650-1400KC)
	Trimmer Cap.	22-859	Osc. Trimmer (600-1300KC)
	Trimmer Cap.	22-873	Osc. Trimmer (540-1200KC)
	Cabinet	14-1676	Model R512F
	Cabinet	14-1677	Model R512W
	Cabinet	14-1678	Model R512R
	Cabinet	14-1679	Model R512V
	Handle	36-95	Model R512W
	Handle	36-96	Models R512R and R512F
	Handle	36-97	Model R512V
	Knob	46-1291	On-Off-Volume & Tuning - Model R512W
	Knob	46-1292	On-Off-Volume & Tuning - Models R512R and R512F
	Knob	46-1293	On-Off-Volume & Tuning - Model R512V
	Knob	46-1294	Pushbutton - 6 used - Model R512W
	Knob	46-1295	Pushbutton - 6 used - Models R512R and R512F
	Knob	46-1296	Pushbutton - 6 used - Model R512V
	Dial Pointer	59-303	

CHASSIS—BOTTOM VIEW



PROPERTY OF
L. F. BLANKENSHIP
3324 MEADE ST.
DENVER, COLORADO

ZENITH MODEL R512F (Ch. 5R10)



IF= 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	33KΩ	8Ω	12Ω	24Ω	†1KΩ	†1KΩ	4.2Meg
V 2	12BA6	3.2Meg	0Ω	24Ω	36Ω	†1KΩ	†1KΩ	68Ω
V 3	12AT6	4.7Meg	0Ω	0Ω	12Ω	1Meg	†1Meg	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	†1KΩ	†225Ω
V 5	35W4	†22Ω	0Ω	85Ω	117Ω	110Ω	110Ω	110KΩ

† MEASURED FROM PIN 7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

277-13